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ABSTRACT

Data from the 1980 Sophomore Cohort of the High School and Beyond (HS&B) study were used to examine the stability of the first employment experiences of high school diploma, associate's degree, and Bachelor's degree recipients. Approximately 51% of the original HS&B sophomore cohort were included in the study. Data used in the study were collected in 1980, 1982, 1984, 1986, and 1992. Questions concerning employment and enrollment after 1986 were by necessity retrospective. High school graduates were less likely to be employed and more likely to have longer periods of not working than were associate's and bachelor's degree recipients. High school graduates who were continuously or sporadically employed in the first 18 months after graduation earned more Carnegie credits in math and English, more total academic credits, and more Carnegie credits overall than high school graduates who were not employed. Among high school graduates, likelihood of being continuously employed after graduation increased with number of hours worked per week in the junior year. Among women with a high school education, having children by 1984 was associated with a lower likelihood of continuous employment. (Twenty-one tables/figures are included. Appended are a glossary and technical notes and information on the study methodology.) (MN)

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Statistical Analysis Report September 1997

Postsecondary Education Descriptive Analysis Reports

Continuity of Early Employment Among 1980 High School Sophomores

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FOREWORD

High School and Beyond (HS&B) is a national longitudinal survey of 1980 high school sophomores and seniors conducted by the National Center for Education Statistics (NCES). Intended to document the educational, vocational, and personal development of young people during their high school years and subsequent transition into adulthood, the survey has been administered a total of four times since the base-year survey of students in 1980. The most recent survey was conducted in 1992.

This report describes the continuity of early employment among high school and postsecondary graduates in the 1980 high school Sophomore Cohort. To conduct the analysis, monthly employment and enrollment data on the first 18 months following degree completion were used to construct labor market outcome variables for graduates who entered the work force between 1982 and 1992. The first section of the report investigates the relationship between graduates' early labor market experiences and educational attainment, and reviews the influence of mediating factors including demographic and academic characteristics. The final section examines how graduates' early employment status was related to their 1991 and 1992 labor market experience, including earnings, job satisfaction, and training.

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Several U.S. Department of Education staff also made important contributions to this report. We gratefully acknowledge the guidance of C. Dennis Carroll at NCES. Also at NCES, Mary Frase and Ellen Bradburn reviewed the report and made many helpful suggestions that improved the final product. Finally, we would like to thank the members of the adjudication panel for their careful reading and thoughtful comments. Panel members were Robert Burton, Duc-Le To, Peter Stowe, and Shi-Chang Wu, all from the Department of Education.

HIGHLIGHTS

This report uses the 1980 Sophomore Cohort of the High School and Beyond (HS&B) study to examine the employment stability in the first 18 months after graduation of those graduates whose highest credential was a high school diploma, an associate's degree, or a bachelor's degree. Data were collected in 1980, 1982, 1984, 1986, and 1992; therefore, questions concerning employment and enrollment after 1986 were by necessity retrospective. Recipients of each type of credential with 6 or more months of postsecondary education after attainment of their highest degree by 1992 were also excluded. This was done to ensure that postsecondary experiences after degree attainment would not significantly affect the transition into the labor force or employment outcomes.

Continuity of early employment is discussed in relation to educational attainment, demographic characteristics, family formation, academic experiences, and earlier work history. The final section of the report reviews the labor market experiences of the cohort as much as 10 years after high school graduation in order to identify associations between initial employment stability and long-term labor market patterns.

- High school graduates were less likely to be employed, and more likely to have longer periods of time not working, than were associate's and bachelor's degree recipients. The percentage of recent graduates who were continuously employed for the first 18 months after graduating increased with education, from 29 percent of high school graduates to 54 percent of associate's degree recipients to 62 percent of bachelor's degree recipients.
- High school graduates who were continuously or sporadically employed in the first 18 months after graduation earned more Carnegie credits in math and English, more total academic credits, and more Carnegie credits overall than high school graduates who were not employed (17 to 18 credits versus 15 credits overall).
- Among associate's degree recipients, those who were continuously employed earned about the same number of postsecondary credits in humanities, business, calculus and advanced math, and computer-related courses as those who were sporadically employed. The one difference observed was in remedial coursework: those who were continuously employed took slightly fewer (1.5, on average) remedial courses than those who were sporadically employed (2.0 courses, on average). Bachelor's degree holders also took similar numbers of postsecondary credits in each of the subject areas

mentioned above, as well as similar numbers of remedial courses, across all employment status categories.

- Among high school graduates, the likelihood of being continuously employed after graduation increased with the number of hours they worked per week in their junior year.
- Women with a high school education who had children by 1984 were less likely to be continuously employed in the first 18 months following graduation than those who had not had children by that time. Having children was not associated with employment continuity for men.
- About 35 percent of male high school graduates were continuously employed, compared with 22 percent of females with a similar level of education. In contrast, among associate's and bachelor's degree holders, similar proportions of men and women were continuously employed.
- High school graduates who were not employed at any time during the first 18 months following graduation earned approximately $15,700 in 1991, while those who were initially continuously employed earned $21,700 and those who were sporadically employed earned $18,500.
- One-third of graduates whose highest level of educational attainment was a high school diploma had received employer-provided training in 1991–92, compared with 43 percent of their peers with associate's degrees and 59 percent with bachelor's degrees.

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INTRODUCTION

The time immediately following high school graduation and postsecondary degree attainment is a period of transition in most young people's lives. While some recent graduates enter the labor market and work continuously for a number of months, others may work sporadically, juggle jobs and classes, travel, move from one job to another, or alternate work with periods of unemployment. In addition, some youth may delay entering the labor market completely, opting to continue their education for a semester or more before seeking work.

Regardless of the path they pursue, high school graduates' early career experiences are typically characterized by a high rate of job turnover and multiple employment spells.[1] While the length of this period of "milling about" varies by individual, typically somewhere between their early and mid-20s most high school graduates find stable employment in a single job that they hold over a number of years. In the meantime, however, many young people may be unemployed, perhaps repeatedly. While research on high school graduates who never attended a postsecondary institution has often sought to determine how job turnover affects future labor market success, fewer studies have examined the extent and importance of unemployment between jobs, or of sustained unemployment among those who take months or years to begin working. Moreover, few studies have compared the labor market entry of non-college-bound high school graduates with that of new graduates from postsecondary programs.

This report uses data from the 1980 Sophomore Cohort of the High School and Beyond (HS&B) study to address the phenomenon of "milling about" as a function of degree attainment. Specifically, how stable are the first employment experiences of new recipients of a high school diploma, an associate's degree, or a bachelor's degree?[2] Is the employment stability of graduates related to the type of degree they earned? Is it associated with their demographic characteristics, family formation, academic experiences, or earlier work history? This report also reviews the la-

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[1]J.A. Klerman and L.A. Karoly, *The Transition to Stable Employment: The Experiences of U.S. Youth in Their Early Labor Market Career* (Santa Monica: RAND Corporation, 1995); D. Stern, N. Finkelstein, J. Strong, J. Latting, and C. Dornsife, *Research on School-To-Work Transition Programs in the United States* (Berkeley: National Center for Research in Vocational Education, 1994); and A.L. Gustman and T.L. Steinmeier, "Labor Markets and Evaluations of Vocational Training Programs in the Public High Schools—Toward a Framework for Analysis," *Southern Economic Journal* 49 (1) (July 1982): 183–200.

[2]Data were collected in 1980, 1982, 1984, 1986, and 1992; therefore, questions concerning employment and enrollment after 1986 were by necessity retrospective.

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bor market experiences of the cohort as much as 10 years after high school graduation in order to identify the relationship between initial employment stability and long-term labor market patterns. In this section, a number of questions are addressed, among them: How much did recent graduates earn? What kinds of work did they do, and did they like their jobs?

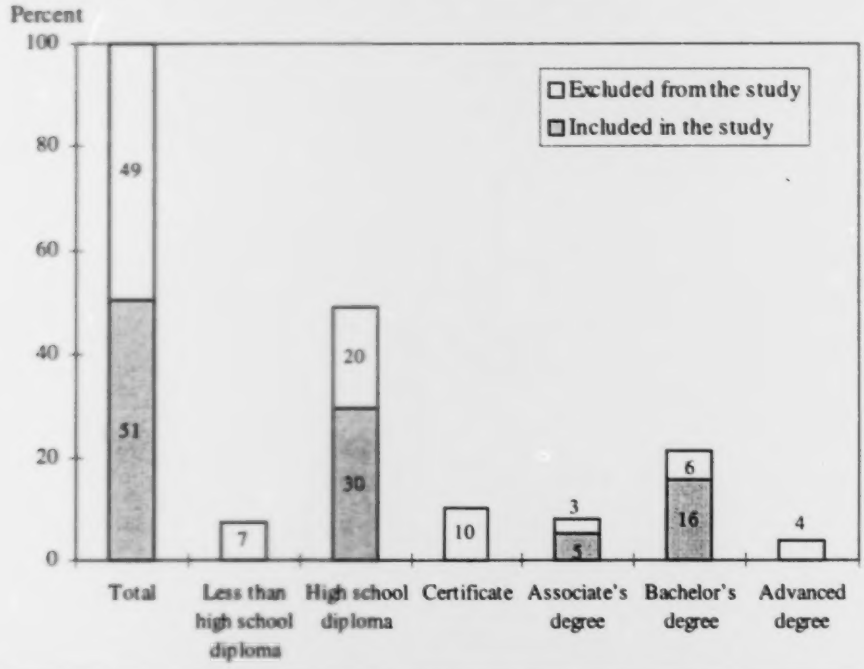
This report describes events that occurred as much as a decade ago and the experiences of this cohort cannot necessarily be generalized to all high school cohorts. However, analyzing the early labor market experiences of these new graduates can provide a useful benchmark against which to assess current efforts to facilitate the transition from school to work. For instance, these data on the new graduates' unemployment may serve as a baseline indicator for future programs designed to help graduates find jobs. Moreover, the longitudinal nature of the HS&B survey enables researchers to compare initial employment continuity with later work experiences, thereby contributing a unique perspective to the school-to-work literature.

PARTICIPANTS IN THE STUDY

Drawing upon the Sophomore Cohort of the 1980 HS&B data set, this report examines the initial labor market experiences of those whose highest degree attainment by 1992 was an associate's or bachelor's degree, as well as those who terminated their education with a high school diploma. Specifically, monthly employment and enrollment data for the first 18 months following degree completion are used to construct labor market outcome variables for graduates who entered the work force between 1982 and 1991. Because students could complete their educational program at any time before 1990, timing of labor market entry varies across individual cases.

Approximately 51 percent of the HS&B Sophomore Cohort was eligible to be included in the study (figure 1). High school dropouts, recipients of a postsecondary certificate, and recipients of advanced postsecondary degrees were excluded from the study. The results of the analysis revealed that high school dropouts were likely to experience quite complex transition patterns, particularly if they returned to school one or more times after spending time in the labor force. Similarly, recipients of a postsecondary certificate were a diverse group, with time-to-degree ranging from a few weeks or months to 1 or more years. Accurately characterizing the transition patterns of these two groups would be an analysis task in itself, one that is beyond the scope of this study.

Figure 1—Percentage distribution of 1980 high school sophomores by highest degree earned through 1992, by whether they were included in the study



SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

Advanced postsecondary degree recipients were excluded from this analysis because they are a small group with relatively limited labor force experience after completing their highest degree (the HS&B data are limited to a 10-year horizon). Finally, high school graduates, associate's degree recipients, and bachelor's degree recipients with 6 or more months of postsecondary education after attainment of their highest degree by 1992 were also excluded. This was done to ensure that postsecondary experiences after degree attainment would not significantly affect the transition into the labor force or employment outcomes.

Overall, by 1992, the highest credential earned by 49 percent of the Sophomore Cohort was a high school diploma; 8 percent had earned an associate's degree; and 21 percent had earned a bachelor's degree (figure 1). A proportion of each attainment group was excluded from this study either because they failed to meet the analysis criteria, or because data on employment and enrollment experiences in the first 18 months after degree attainment were unavailable (see appen-

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dix B for an analysis of excluded cases). Moreover, because the study depends on longitudinal data, only individuals who responded to all five waves of data collection were included in the analyses presented here. The following section discusses the effects of these exclusions on the results of the study.

THE STUDY SAMPLE

While this study provides useful data on the early employment experiences of specific groups of recent graduates, the data are not representative of the Sophomore Cohort as a whole. Moreover, data on those with a high school education in particular are not representative of those in the cohort whose highest level of education by 1992 was a high school diploma. About 40 percent of the high school educated (20 percent of the entire cohort) were excluded from the study, either because they had attended a postsecondary institution for 6 months or more, or because they were missing employment and enrollment data (figure 1).

Many researchers of the school-to-work transition have made a distinction between high school graduates with little or no postsecondary education and those who spent more than one semester enrolled, or earned a specified number of credits after high school graduation.[3] While some researchers have found no labor market returns to postsecondary education which did not terminate in a credential,[4] others provide evidence of a 4 to 7 percent increase in annual earnings for every 30 credits earned, even without a degree.[5] While this report excludes those with 6 months' or more postsecondary experience in order to avoid confusing graduates who were primarily working with those who were students in the first 18 months after graduation, the effect may be to exclude those who were ultimately more successful in the labor market. Indeed, analysis of the high school educated cases in the Sophomore Cohort which were excluded from this study shows that their earnings in 1991 were about $21,300, or $2,200 more than those included the study.[6] Thus, it is important to keep in mind that the "high school graduate" group discussed here may be a less-educated subset of all those whose highest credential is a high school diploma.

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[3]See, for example, N. Grubb, *The Returns to Education and Training in the Sub-Baccalaureate Labor Market* (Berkeley: National Center for Research in Vocational Education, 1995); T.J. Kane and C.E. Rouse, "Labor-Market Returns to Two-and Four-Year Colleges," *The American Economic Review* 85 (3) (June 1995): 600–614; J.R. Veum and A.B. Weiss, "Education and the Work Histories of Young Adults," *Monthly Labor Review*, April 1993; N. Grubb, "Postsecondary Vocational Education and the Sub-B.A. Labor Market," working paper, School of Education at University of California at Berkeley.

[4]N. Grubb, 1995 and 1991.

[5]T.J. Kane and C.E. Rouse, 1995.

[6]U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

Further, Asian/Pacific Islanders and those who had not married or had children by 1984 were especially likely to be excluded from the high school group, as were those with 1982 test scores in the highest quartile,[7] those who attended private high schools, and those from the highest SES quartile (table 1). This may be because these groups attend postsecondary institutions at higher rates than their counterparts.[8]

Since those who acquire postsecondary education do tend to have more stable early employment histories, the effects of the bias may be to overstate the employment instability of the high school educated group as a whole. It is particularly important to keep this in mind where comparisons are made between the three educational attainment groups, as associate's and bachelor's degree recipients tend to have more stable employment patterns than the group of high school graduates included here. In addition, differences in the demographic and academic characteristics of each attainment group (presented in appendix table B1) may also be more pronounced in this study because of the pattern of exclusions among the high school educated.

Finally, the sample size of associate's degree recipients is under 900 cases, and consequently the standard errors for estimates of associate's degree holders are often large. As a result, estimates of groups of associate's degree holders frequently appear to differ from each other when the difference between groups is not statistically significant. In some cases the magnitude of the difference between subgroups of associate's degree recipients is as large or larger than a comparable difference between subgroups of high school graduates or bachelor's degree holders, but the difference among associate's degree recipients is not statistically significant while it is significant among those with a high school diploma or bachelor's degree. This phenomenon is noted in the text where it occurs. An example table of standard errors is presented in appendix B (table B2).

[7]Test scores are composites of standardized reading, vocabulary, and math tests administered in 1982. See appendix A for a detailed description of this variable.

[8]J. Tuma and S. Geis., *Educational Attainment of 1980 High School Sophomores by 1992* (Washington, DC: U.S. Department of Education, National Center for Education Statistics, 1995).

Table 1—Percentage distributions of 1980 high school sophomores whose highest credential by 1992 was a high school diploma, an associate's degree, or a bachelor's degree, by whether they were included in the study, by selected demographic characteristics

	High school diploma		Associate's degree		Bachelor's degree	
	Excluded	Included	Excluded	Included	Excluded	Included
Total	39.8	60.2	33.2	66.8	26.9	73.1
Gender						
Male	37.9	62.2	34.8	65.2	26.0	74.0
Female	41.8	58.2	32.0	68.0	27.7	72.3
Race–ethnicity						
Native American/Alaskan Native	36.7	63.4	—	—	—	—
Asian/Pacific Islander	60.2	39.8	—	—	31.7	68.3
Black, non-Hispanic	42.2	57.8	33.4	66.6	23.8	76.2
White, non-Hispanic	39.3	60.8	32.3	67.7	27.1	72.9
Hispanic	38.3	61.7	40.5	59.5	25.2	74.8
Socioeconomic status 1980						
Bottom quartile	25.4	74.6	27.4	72.6	24.4	75.6
Middle quartiles	41.5	58.5	31.1	68.9	27.0	73.0
Top quartile	63.9	36.1	43.8	56.2	27.1	72.9
Test score composite 1982						
Bottom quartile	25.1	74.9	30.4	69.6	25.6	74.4
Middle quartiles	41.6	58.4	33.7	66.3	29.2	70.8
Top quartile	71.6	28.4	33.1	66.9	25.3	74.7
Control of high school						
Public	38.2	61.8	33.1	66.9	27.6	72.4
Private or parochial	65.2	34.8	34.0	66.0	23.1	76.9
Marital status as of February 1984						
Never married	44.2	55.8	31.8	68.2	26.6	73.4
Divorced/widowed/separated	16.0	84.0	—	—	—	—
Married or cohabit as married	25.2	74.8	41.5	58.5	40.3	59.7
Had a child as of February 1984*						
Yes	21.3	78.7	27.9	72.1	—	—
No	43.4	56.6	33.1	66.9	26.8	73.2

—Too few cases for a reliable estimate.

*The ranges of estimates for associate's degree recipients do not contain the estimates shown in the total row due to missing values on this variable.

NOTE: Percentages may not sum to 100 due to rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School & Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

CHARACTERIZING EARLY EMPLOYMENT

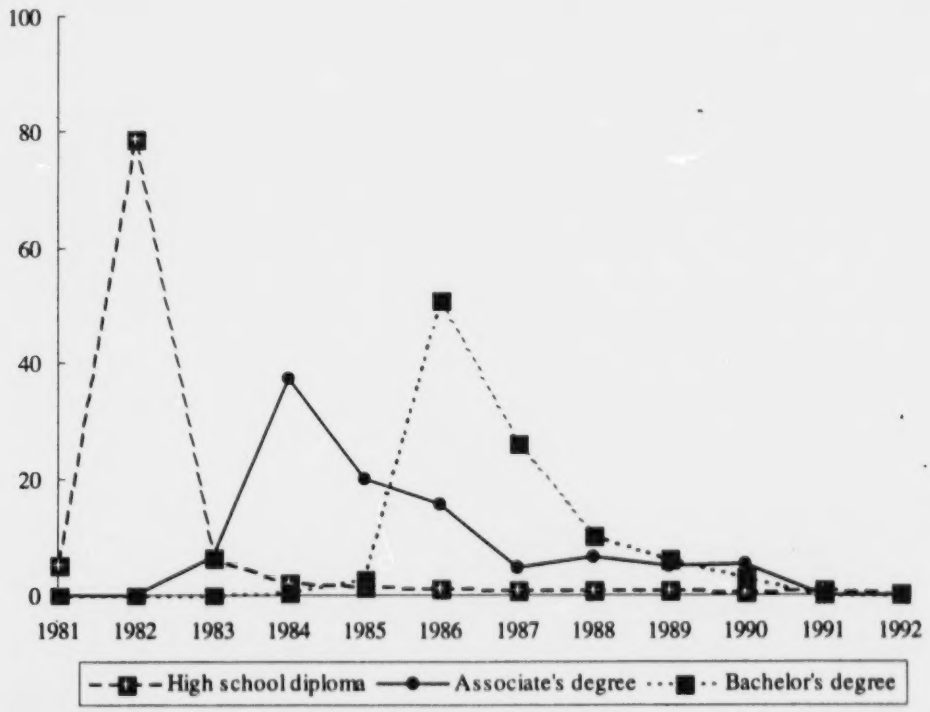
The discussion of early employment focuses on the first 18 months after graduates attained their degree of interest (high school diploma, associate's degree, or bachelor's degree). Because the data represent a grade cohort and the time it takes to earn each degree varies, the first 18 months of post-graduation labor force experience for each group occur at different times. Figure 2 shows that the majority of high school diploma recipients graduated in 1982, while associate's degree recipients typically earned their degrees in 1984 or 1985 and bachelor's degree recipients did so in 1986 or 1987. Thus, most high school graduates entered the labor force several years before their peers who earned associate's degrees, who in turn entered the labor market two or three years before the typical bachelor's degree recipient.

During the first 18 months after degree attainment, new graduates may have changed their employment status one or more times. In particular, they may have worked throughout the 18 months, worked for a while and then returned to school or taken a break from working, become unemployed, or not worked at all. Due to differences in the natural timing of degree attainment for those with different credentials (as shown in figure 2), separate variables for those with a high school education, an associate's degree, and a bachelor's degree describe the initial employment status of new graduates by separating them into one of three categories: continuously employed; sporadically employed; and not employed. Appendix A contains a detailed description of these variables.

Since recent graduates' demographic and academic characteristics, initial labor market experiences, and timing of labor force entry differ by their educational background, all analyses in this report controlled for degree attainment. However, it is important to note that recent graduates of associate's and bachelor's degree programs tend to be older than recent high school graduates, and consequently differences in employment continuity may be related to age as well as education. Indeed, research has shown a general increase in the employment rates of young people as they age. For instance, March 1994 Current Population Survey data show that unemployment rates decreased from 12 percent to 8 percent as the age range of cohorts increased from 20–24 years to 25–29, not controlling for school enrollment or education.[9]

[9]U.S. Department of Education, National Center for Education Statistics, *The Condition of Education 1995* (Washington, DC: 1995), table 29-1.

Figure 2—Percentage distributions of 1980 high school sophomores whose highest credential by 1992 was a high school diploma, an associate's degree, or a bachelor's degree,* by year they attained their highest degree



*Includes only those who had fewer than 6 months of postsecondary enrollment between degree attainment and February 1992.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

It is also worth noting that the economic situation of the nation shifted slightly during the 1980s; therefore, the labor market into which the HS&B high school graduates entered was different from that encountered by associate's or bachelor's degree recipients. In particular, the unemployment rate for 20- to 24-year-olds fell during the 1980s, from 11.5 percent in 1980 to 8.8 percent by 1990.[10] It is possible that such changes in the economy contribute to differences in the rates of continuous employment observed in this study among high school and postsecondary graduates. Other labor market conditions (such as local unemployment rates) might also influence the labor market experiences of cohort members, but a thorough analysis of these conditions is beyond the scope of this report.

[10]U.S. Bureau of the Census, *Statistical Abstract of the United States: 1995,* 115th ed. (Washington, DC: 1995), table 658.

The first section of this report investigates the relationship between graduates' initial labor market entry and educational attainment, and then discusses how their school experiences, work history, academic achievement, family formation, and background characteristics were related to the early employment experiences of each educational attainment group. It also looks at the relationships between each academic and background characteristic and graduates' early employment while controlling for covariance among the variables studied. The second section examines the association between graduates' initial labor market experiences and 1991 and 1992 labor market outcomes, including earnings, job satisfaction, and occupation. The report concludes with a brief summary of the findings.

INITIAL LABOR MARKET ENTRY

For many new graduates, working after graduation or degree completion was not an introduction to the labor force, but rather a continuation of their earlier participation. In fact, 84 percent of the High School and Beyond (HS&B) sophomores reported having worked for pay by the time they graduated from high school.[11] Although having a job (or looking for a job) may not have been a new experience for many recent high school or college graduates, finding and holding a job may have taken on a new importance as these young people sought to become more self-sufficient and assume adult roles in society.

EDUCATIONAL ATTAINMENT AND INITIAL LABOR MARKET PARTICIPATION

In comparing the employment patterns of recent graduates it was found that high school graduates were less likely to be employed, and more likely to spend periods of time not working, than were associate's and bachelor's degree recipients.[12] As shown in figure 3, the percentage of recent graduates who were continuously employed for the first 18 months after graduating increased with education, from 29 percent of high school graduates to 54 percent of associate's degree recipients to 62 percent of bachelor's degree recipients. Moreover, about 52 percent of high school graduates were sporadically employed compared with 40 percent of associate's degree recipients and 35 percent of bachelor's degree recipients. Finally, as educational attainment increased, recent graduates' likelihood of not being employed after graduation fell, from 19 percent of high school graduates to 6 percent of associate's degree recipients and to 3 percent of bachelor's degree recipients. Higher rates of continuous employment were consistently observed among associate's and bachelor's degree holders compared with high school graduates even after taking into account gender, race–ethnicity, and SES (figure 4).

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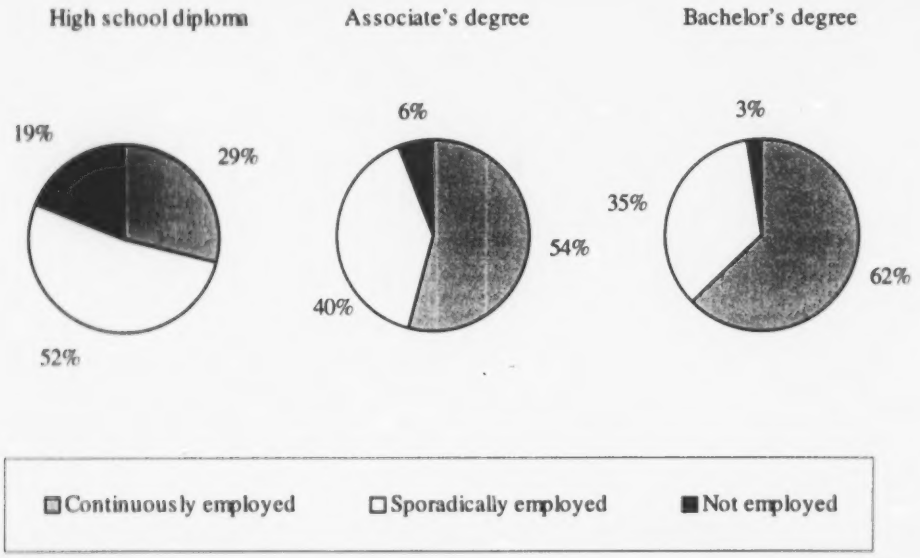
[11]U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

[12]Graduates who were "not employed" worked 2 or fewer months in the 18-month period following graduation. They may have spent the other months unemployed and seeking work, or out of the labor force entirely.

Figure 3—Employment status in the first 18 months after highest degree attainment by 1992 among 1980 high school sophomores whose highest credential by 1992 was a high school diploma, an associate's degree, or a bachelor's degree,* by degree group



*Includes only those who had fewer than 6 months of postsecondary enrollment between attainment and February 1992.

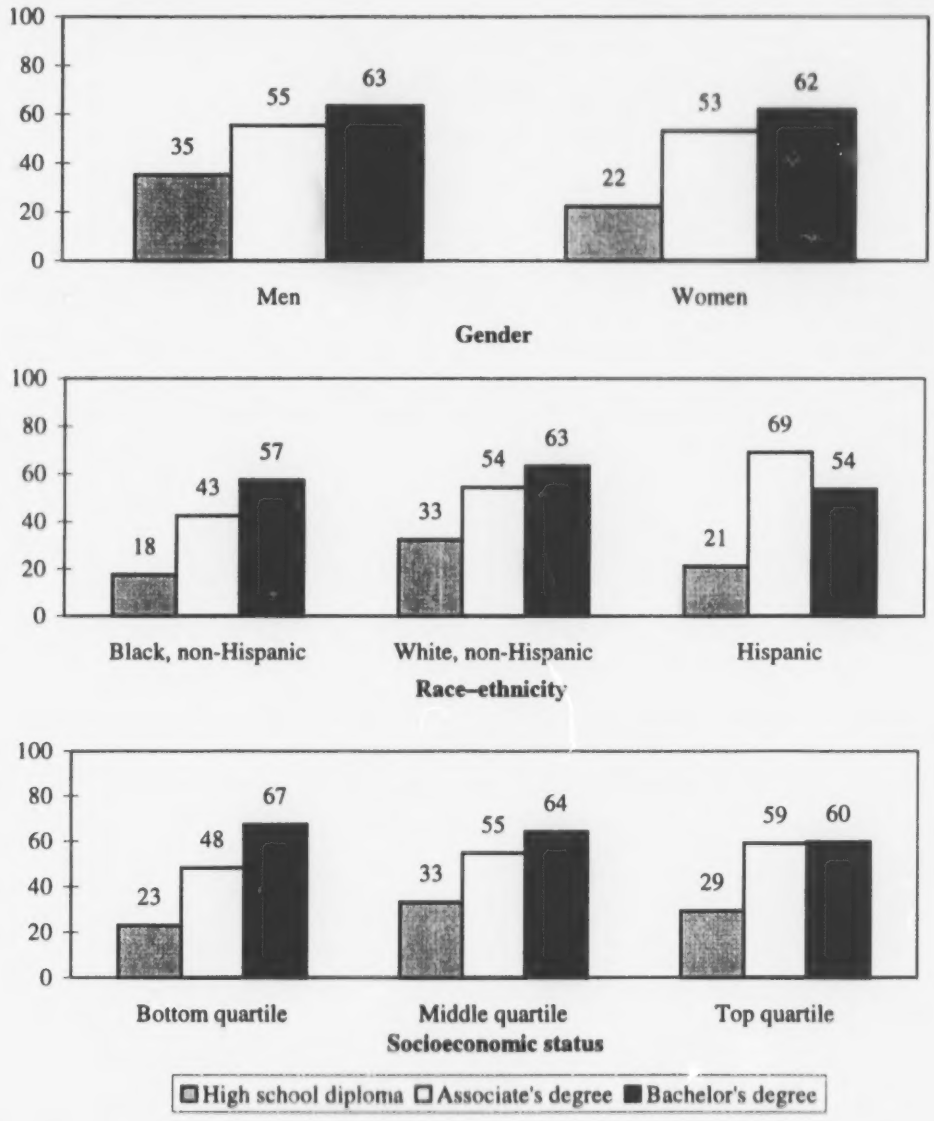
SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

EDUCATIONAL PROGRAM

High School Graduates

In recent years, many researchers seeking to understand how high school curriculum influences students' transition into the labor market have focused on students' track (academic, vocational, or general) and course-taking patterns. Evidence of a connection between curriculum and later labor market experience is not entirely conclusive. For example, in a study of the effects of vocational and academic course taking in high school, Rumberger and Daymont (1984) found that although neither the academic nor vocational curriculum provided a significant advantage over the other, the number of credits students earned overall was positively associated with their

Figure 4—Percentage of 1980 high school sophomores* who were continuously employed in the first 18 months after graduation by highest degree earned through 1992, by gender, race–ethnicity, and socioeconomic status



*Includes only those who had fewer than 6 months of postsecondary enrollment between degree attainment and February 1992, and whose highest credential by 1992 was a high school diploma, an associate's degree, or a bachelor's degree.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

hourly wages, annual weeks employed, and annual hours worked after high school.[13] Thus, earning credits may indicate to employers the knowledge high school students have acquired as well as their willingness to attend classes and complete assignments. On the other hand, low credit counts may indicate that students have dissociated themselves from school, which could lead to alienation from the job market in the future.

The results found in this study are consistent with such earlier findings. High school graduates had similar initial labor market experiences regardless of the educational track they pursued during high school (table 2). For example, 28 percent of high school graduates who studied in the general track were continuously employed in the first 18 months of labor market participation, while 27 percent of those who studied in the academic and 31 percent of those who studied in the vocational track were similarly employed. Additionally, about the same proportions of public as private high school graduates were continuously (29 to 32 percent), sporadically (52 percent) and not employed (15 to 19 percent).

There was also evidence in this study that the number of credits graduates earned overall was positively related to their employment. High school graduates who were continuously or sporadically employed in the first 18 months after graduation had earned more Carnegie credits in math and English, more total academic credits, and more Carnegie credits overall than their counterparts who were not employed after graduating (17 to 18 credits versus 15 credits overall) (table 3).

[13]R. Rumberger and T. Daymont, "The Economic Value of Academic and Vocational Training Acquired in High School," in *Youth in the Labor Market*, ed. M. Borus (Kalamazoo, MI: W. E. Upjohn Institute for Employment Research, 1984).

Table 2—Percentage distribution of employment status in the first 18 months after high school graduation among 1980 high school sophomores whose highest credential by 1992 was a high school diploma,* by selected school characteristics

	Continuously employed	Sporadically employed	Not employed
Total	29.1	52.0	18.9
Program in high school			
General	27.6	54.4	18.0
Academic	26.7	53.2	20.1
Vocational	31.2	49.8	19.1
Control of high school			
Public	29.0	52.0	19.0
Private or parochial	32.1	52.4	15.4

*Includes only those who had fewer than 6 months of postsecondary enrollment between degree attainment and February 1992.

NOTE: Percentages may not sum to 100 due to rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School & Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

Table 3—Average number of credits earned in high school in various subject areas by 1980 high school sophomores whose highest credential by 1992 was a high school diploma,[1] by employment status in the first 18 months after high school graduation

	Total	Academic areas[2]	Mathematics	English	Vocational areas[3]
Total	17.2	10.2	1.8	3.2	4.9
Employment status					
Continuously employed	18.4	10.7	1.9	3.3	5.5
Sporadically employed	17.4	10.5	1.8	3.3	4.8
Not employed	14.7	8.9	1.5	2.9	4.1

[1]Includes only those who had fewer than 6 months of postsecondary enrollment between degree attainment and February 1992.

[2]Academic areas include mathematics, science, English, social studies, fine arts, and foreign languages (from the Secondary School Taxonomy applied to high school transcripts).

[3]Vocational areas include agriculture, business, marketing and distribution, health, occupational home economics, trade and industry, and technical communications (from the Secondary School Taxonomy applied to high school transcripts).

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School & Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

Postsecondary Graduates

The field of study and types of courses that students take in a community college or university may provide them with skills and knowledge that influence their initial labor market success,[14] or serve to indicate their ability to employers. This study examined this phenomenon by determining how major field of study and courses taken in various subject areas were associated with the early employment patterns of postsecondary graduates. It also examined the association of delayed entry into postsecondary education with early employment patterns.

In some instances, the major field of study of associate's degree recipients was related to employment stability. For example, those who concentrated in health occupations (77 percent) were more likely than those who majored in business support (38 percent) to be continuously employed after graduation (table 4). About 14 percent of business support majors were not employed after graduation, a proportion that appears to be much higher than any other major, although there was not enough statistical evidence to conclude that this proportion was different from the others.

Among bachelor's degree recipients, although choice of college major also appeared to be related to employment experiences (e.g., about 67 percent of biological and physical science majors were continuously employed, as were 59 percent of engineering, architecture, math, and computer science majors), these differences were associated with large standard errors and were not statistically significant.

Unlike high school graduates, the number of credits postsecondary graduates earned in various subject areas was not related to their early labor market experiences. Among associate's degree recipients, those who were continuously employed earned about the same number of credits in each subject area as those who were sporadically employed (table 5). The one difference observed was in remedial coursework: those who were continuously employed took slightly fewer (1.5, on average) remedial courses than those who were sporadically employed (2.0 courses, on average).[15] Bachelor's degree holders also took similar numbers of credits in each area, as well as similar numbers of remedial courses, across all employment status categories.

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[14]G. Becker, *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education* (New York: Columbia University Press [prepared for the National Bureau of Economic Research], 1964).

[15]Since remedial courses usually carry either no credit or nonadditive credit (credit that does not count toward degrees), "number of remedial courses" is preferred over "number of remedial credits" for this analysis.

Table 4—Percentage distribution of employment status in the first 18 months after highest degree attainment among 1980 high school sophomores whose highest credential by 1992 was an associate's or bachelor's degree,[1] by selected demographic characteristics

	Continuously employed	Sporadically employed	Not employed
		Associate's degree	
Total	54.0	40.1	5.9
Undergraduate major			
Business	54.3	42.3	3.4
Business support	38.4	47.2	14.4
Computers and technical areas	66.4	30.9	2.7
Health occupations	77.4	22.6	0.0
General/liberal studies	53.3	42.2	4.5
Other	52.6	45.2	2.2
Type of start in postsecondary education			
Enrolled October 1982 or earlier	50.5	43.6	6.0
Enrolled November 1982 or later	62.9	31.3	5.8
		Bachelor's degree	
Total	62.4	35.0	2.5
		Undergraduate major	
Business	63.3	34.5	2.2
Engineering, architecture, math, computer science	58.6	38.5	3.0
Biological and physical science	67.1	30.1	2.7
Health science and services	60.4	39.6	0.0[2]
Arts and humanities	61.3	35.7	3.0
Social science	64.0	33.1	2.9
Other	67.1	30.9	2.0
Type of start in postsecondary education			
Enrolled October 1982 or earlier	63.2	34.7	2.1
Enrolled November 1982 or later	53.9	39.1	7.0

[1]Includes only those who had fewer than 6 months of postsecondary enrollment between degree attainment and February 1992.

[2]Estimate is between 0.005 and 0.05.

NOTE: Percentages may not sum to 100 due to rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School & Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

Table 5—Average number of undergraduate credits earned in various subject areas and average number of remedial courses taken by 1980 high school sophomores whose highest credential by 1992 was an associate's or bachelor's degree,[1] by degree and employment status in the first 18 months after highest degree attainment[2]

	Total	Humanities	Business	Calculus and advanced math	Computer-related	Number of remedial courses[3]
			Associate's degree			
Total	70.5	5.9	8.6	0.3	4.9	1.7
Continuously employed	72.7	6.4	9.2	0.3	5.5	1.5
Sporadically employed	69.6	5.2	7.8	0.3	4.4	2.0
Not employed	—	—	—	—	—	—
			Bachelor's degree			
Total	134.6	19.5	18.0	3.6	6.0	0.9
Continuously employed	134.7	18.9	18.0	3.4	5.9	0.9
Sporadically employed	134.2	20.5	18.0	3.9	6.4	0.9
Not employed	137.9	20.3	15.5	2.1	5.1	1.0

—Too few cases for a reliable estimate.

[1]Includes only those who had fewer than 6 months of postsecondary enrollment between degree attainment and February 1992.
[2]Data from the postsecondary transcript analysis file HSTUPETS 8/6/96.
[3]Since remedial courses usually carry either no credit or nonadditive credit (credit that does not count toward degrees), number of remedial courses is preferred over number of remedial credits for this analysis.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School & Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

Students who waited to enroll in postsecondary education had somewhat different employment experiences after degree attainment than those who entered immediately after high school.[16] Among associate's degree holders, those who delayed enrollment were more likely to be continuously employed in the first 18 months following labor force entry (63 percent) than were those who entered college without delaying (51 percent) (table 4). This finding may reflect the tendency of associate's degree completers to work during school at higher rates than bachelor's degree recipients.[17] If associate's degree recipients who delayed enrollment did so because

[16]Students who first enrolled in a postsecondary institution in November 1982 or later were considered to have delayed enrollment.

[17]L. Horn, *Undergraduates Who Work While Enrolled in Postsecondary Education: 1989–90* (Washington, DC: U.S. Department of Education, National Center for Education Statistics, 1994).

they were working before enrollment as well, they may have had work experience, contacts in the labor market, or existing jobs which enabled them to make a relatively smoother transition to the labor force after graduation.

Among bachelor's degree recipients, 63 percent of those who enrolled immediately after high school were continuously employed following college graduation, as were 54 percent of those who delayed enrollment (table 4). However, small sample sizes make it impossible to determine whether the perceived difference in employment rates is real or simply a statistical artifact.

WORK EXPERIENCE

Among high school graduates, the likelihood of being continuously employed increased with the number of hours they worked per week in their junior year of high school (table 6). For example, high school graduates who had not worked in their junior year of high school were less likely to be continuously employed (21 percent) and more likely not to be employed (23 percent) in the first 18 months following labor market entry than those who had worked 15–29 hours per week as juniors (39 percent continuously employed and 13 percent not employed). Data on the work experience of associate's and bachelor's degree recipients during the years they were students in postsecondary institutions were not available.

Table 6—Percentage distribution of employment status in the first 18 months after high school graduation among 1980 high school sophomores whose highest credential by 1992 was a high school diploma,* by number of hours worked in 11th grade

	Continuously employed	Sporadically employed	Not employed
Total	29.1	52.0	18.9
Number of hours worked in 11th grade			
None	20.5	56.9	22.7
1–14 hours per week	27.7	52.7	19.6
15–29 hours per week	38.6	48.8	12.7
30 or more hours per week	40.4	49.8	9.8

*Includes only those who had fewer than 6 months of postsecondary enrollment between degree attainment and February 1992.

NOTE: Percentages may not sum to 100 due to rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School & Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

ACADEMIC ABILITY

A review of test scores and grades suggests that greater scholastic ability was associated with easier labor market transitions among graduates with a high school diploma or an associate's degree (table 7). In contrast, the grades that recent bachelor's degree recipients earned in college bore little relationship to their early labor market experiences after degree attainment.

High school graduates with 1982 test scores in the bottom quartile were less likely to be continuously employed (23 percent) and more likely not to be employed (28 percent) in the first 18 months following high school graduation than their counterparts with higher test scores (table 7). Likewise, associate's degree recipients with ability test scores in the lowest quartile were less likely to be continuously employed than their peers with similar education and test scores in the middle quartiles. However, 12th-grade test scores were not related to initial labor market experiences for bachelor's degree recipients. Although 75 percent of bachelor's degree recipients with test scores in the bottom quartile were continuously employed, as were 61 to 63 percent of those with higher scores, this difference was associated with large standard errors, making the estimates somewhat unreliable, and the differences were not statistically significant.

Among high school graduates, earning low grades, like having low test scores, was negatively associated with continuous employment after high school. To illustrate, 33 to 37 percent of those who earned mostly A's, B's, or C's were continuously employed after high school, compared with 20 percent of those who earned mostly D's or F's (table 7). In contrast, college GPA was not directly related to employment continuity in the first 18 months after graduation.[18] For example, between 61 and 66 percent of bachelor's degree recipients were continuously employed, regardless of their grades.

FAMILY FORMATION

Having a family at a young age was associated with lower educational attainment and less stable employment for new graduates. For example, about 19 percent of men and women whose highest level of education was a high school diploma had children by 1984, when most of the cohort was about 20 years old, compared with about 6 percent of those with associate's degrees and 1 percent of those with bachelor's degrees (figure 5).

[18]Although it appears that associate's degree recipients who had earned mostly B's were more likely to be continuously employed that those who had earned A's or C's, these differences are associated with large standard errors. The estimates are consequently unreliable and the differences between them are not statistically significant.

Table 7—Percentage distribution of employment status in the first 18 months after highest degree attainment among 1980 high school sophomores,* by degree group and selected academic characteristics

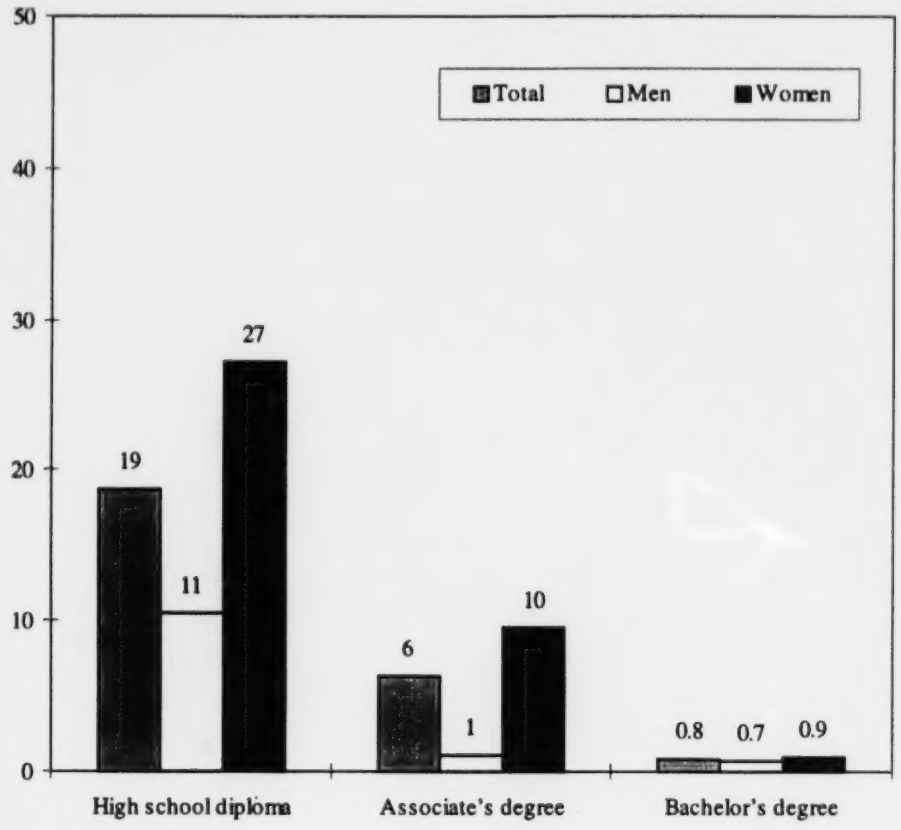
	Continuously employed	Sporadically employed	Not employed
		High school diploma	
Total	29.1	52.0	18.9
Test score composite 1982			
Bottom quartile	22.9	48.8	28.3
Middle quartiles	32.3	54.3	13.4
Top quartile	34.2	59.6	6.1
Grades in high school			
Mostly A's	37.4	44.9	17.6
Mostly B's	34.7	52.9	12.5
Mostly C's	33.0	51.1	15.9
Mostly D or lower	20.4	55.0	24.6
		Associate's degree	
Total	54.0	40.1	5.9
Test score composite 1982			
Bottom quartile	35.7	55.1	9.1
Middle quartiles	58.3	36.1	5.6
Top quartile	52.1	42.8	5.1
Postsecondary grades			
Mostly A's	50.9	45.0	4.0
Mostly B's	59.2	35.8	5.1
Mostly C or lower	51.7	41.7	6.6
		Bachelor's degree	
Total	62.4	35.0	2.5
Test score composite 1982			
Bottom quartile	74.9	18.1	7.0
Middle quartiles	60.9	36.4	2.7
Top quartile	63.1	34.7	2.1
Postsecondary grades			
Mostly A's	62.0	35.1	2.9
Mostly B's	60.2	37.3	2.6
Mostly C or lower	65.5	32.4	2.1

*Includes only those who had fewer than 6 months of postsecondary enrollment between degree attainment and February 1992, and whose highest credential by 1992 was a high school diploma, an associate's degree, or a bachelor's degree.

NOTE: Percentages may not sum to 100 due to rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School & Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

Figure 5—Percentage of 1980 high school sophomores* who had a child by February 1984, by highest degree earned through 1992, by gender

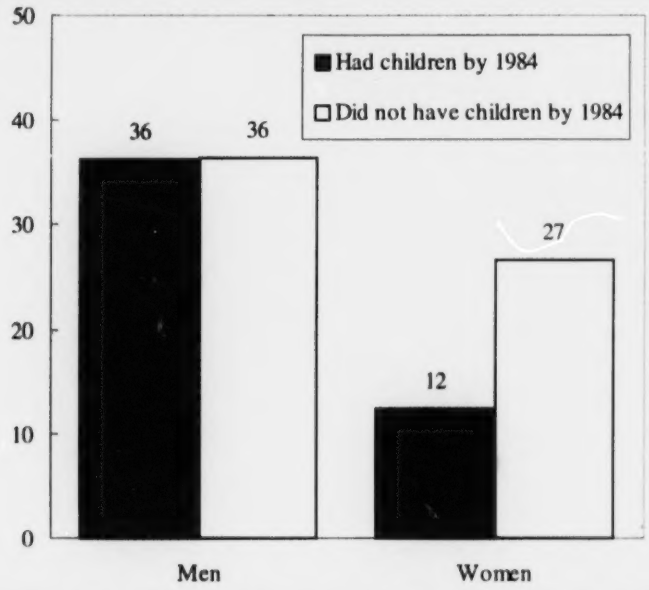


*Includes only those who had fewer than 6 months of postsecondary enrollment between degree attainment and February 1992, and whose highest credential by 1992 was a high school diploma, an associate's degree, or a bachelor's degree.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

Among high school graduates with no postsecondary education, being married was associated with continuous employment for men, but with lack of employment for women. About 44 percent of men who were married as of February 1984 were continuously employed, compared with 34 percent of their never-married peers (table 8). On the other hand, 29 percent of married women were not employed throughout the first 18 months after graduating, as opposed to 20 percent of never-married women. Women who had children by 1984 were also less likely to be continuously or sporadically employed and more likely not to be employed at all in the first 18 months following graduation than were those who delayed childbearing (figure 6). For men, becoming a parent was not associated with employment continuity.

Figure 6—Percentage of 1980 high school sophomores whose highest credential by 1992 was a high school diploma who were continuously employed in the first 18 months after high school graduation,* by gender and childbearing status in February 1984



*Includes only those who had fewer than 6 months of postsecondary enrollment between degree attainment and February 1992.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

Table 8—Percentage distribution of employment status in the first 18 months after highest degree attainment by 1992 among 1980 high school sophomores,[1] by degree group and by marital and childbearing status in February 1984

	Continuously employed	Sporadically employed	Not employed
		High school diploma	
Total	29.1	52.0	18.9
Marital status as of February 1984			
Never married	30.0	53.2	16.7
Male	34.1	51.1	14.9
Female	23.6	56.7	19.8
Divorced/widowed/separated	9.2	77.4	13.4
Male	—	—	—
Female	7.8	76.1	16.0
Married or cohabit as married	28.5	47.4	24.1
Male	44.1	44.6	11.3
Female	22.1	48.6	29.3
Had a child as of February 1984			
Yes	19.2	47.9	32.9
Male	36.3	51.2	12.4
Female	12.4	46.6	41.0
No	32.1	53.4	14.5
Male	36.4	50.4	13.3
Female	26.6	57.3	16.2
		Associate's degree	
Total	54.0	40.1	5.9
Marital status as of February 1984			
Never married	54.1	40.1	5.8
Divorced/widowed/separated	—	—	—
Married or cohabit as married	52.5	41.0	6.5
Had a child as of February 1984[2]			
Yes	62.4	36.8	0.9
No	54.5	40.0	5.5
		Bachelor's degree	
Total	62.4	35.0	2.5
Marital status as of February 1984			
Never married	62.5	35.1	2.4
Divorced/widowed/separated	—	—	—
Married or cohabit as married	60.3	30.7	9.0

Table 8—Percentage distribution of employment status in the first 18 months after highest degree attainment by 1992 among 1980 high school sophomores,[1] by degree group and by marital and childbearing status in February 1984—Continued

	Continuously employed	Sporadically employed	Not employed
Had a child as of February 1984			
Yes	—	—	—
No	62.4	35.0	2.5

—Too few cases for a reliable estimate.
[1]Includes only those who had fewer than 6 months of postsecondary enrollment between degree attainment and February 1992, and whose highest credential by 1992 was a high school diploma, an associate's degree, or a bachelor's degree.
[2]The ranges of estimates do not contain the estimates shown in the total row due to missing values on this variable.

NOTE: Percentages may not sum to 100 due to rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School & Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

In contrast to the high school educated group, among associate's degree holders those who had not had children by 1984 were more likely not to be employed than were those who had become parents (6 versus 1 percent) (table 8). In this study, the small sample size of associate's degree recipients and the low likelihood of childbearing among bachelor's degree recipients prevented analysis by gender.

BACKGROUND CHARACTERISTICS

In general, the early employment experiences of graduates with a high school education tended to vary according to their background characteristics. However, those with associate's and bachelor's degrees displayed more uniform employment experiences across gender, race, and socioeconomic (SES) status.

Differences in initial labor market experiences were apparent between male and female high school graduates, but not among postsecondary degree recipients. To illustrate, 35 percent of male high school graduates were continuously employed, compared with 22 percent of females with a similar level of education (table 9). This may partially reflect the impact of early childbearing on young women's employment continuity (see figures 5 and 6 and table 8). In contrast, among associate's and bachelor's degree holders, similar proportions of men and women

were continuously employed. For example, 65 and 63 percent of men and women with bachelor's degrees worked continuously throughout the first 18 months following labor market entry.

Likewise, while there were some differences in early employment status between racial–ethnic groups with a high school education, such disparities were not significant among recent graduates with more education. Specifically, 33 percent of white, non-Hispanic high school graduates were continuously employed, compared with 18 percent of black non-Hispanics with similar education (table 9). While there appear to be large differences among racial–ethnic groups in the proportion of associate's degree recipients who were continuously employed, large standard errors preclude determining whether differences are statistically significant. For bachelor's degree holders, there was no statistical evidence of any differences among racial–ethnic groups.

Finally, while SES was clearly related to continuity of early employment among high school graduates, the relationship was less clear for those with a postsecondary degree. For example, about one in four high school graduates in the lowest SES quartile were continuously employed after graduating, compared with about one in three of their peers in the middle quartiles (table 9). Among recent associate's and bachelor's degree recipients, while there are apparently large differences in the proportions continuously employed between those in the low and high SES quartiles, there is not enough statistical evidence to conclude that they are different.

Table 9—Percentage distribution of employment status in the first 18 months after highest degree attainment among 1980 high school sophomores,* by degree group and selected demographic characteristics

	Continuously employed	Sporadically employed	Not employed
		High school diploma	
Total	29.1	52.0	18.9
Gender			
Male	35.3	50.2	14.5
Female	22.3	54.0	23.7
Race–ethnicity			
Native American/Alaskan Native	22.6	55.0	22.4
Asian/Pacific Islander	16.4	55.3	28.3
Black, non-Hispanic	17.6	51.2	31.2
White, non-Hispanic	32.5	51.8	15.7
Hispanic	21.2	54.9	24.0
Socioeconomic status 1980			
Bottom quartile	23.0	53.0	24.0
Middle quartiles	33.1	52.2	14.7
Top quartile	29.3	50.4	20.4
		Associate's degree	
Total	54.0	40.1	5.9
Gender			
Male	55.4	38.9	5.7
Female	53.1	40.9	6.1
Race–ethnicity			
Native American/Alaskan Native	—	—	—
Asian/Pacific Islander	—	—	—
Black, non-Hispanic	42.5	54.4	3.2
White, non-Hispanic	54.4	39.5	6.1
Hispanic	69.0	21.8	9.2
Socioeconomic status 1980			
Bottom quartile	48.2	42.4	9.4
Middle quartiles	54.7	40.7	4.7
Top quartile	59.0	34.2	6.8
		Bachelor's degree	
Total	62.4	35.0	2.5
Gender			
Male	63.3	35.3	1.5
Female	61.6	34.8	3.6

Table 9—Percentage distribution of employment status in the first 18 months after highest degree attainment among 1980 high school sophomores,* by degree group and selected demographic characteristics—Continued

	Continuously employed	Sporadically employed	Not employed
Race–ethnicity			
Native American/Alaskan Native	—	—	—
Asian/Pacific Islander	67.9	27.5	4.7
Black, non-Hispanic	57.4	39.1	3.5
White, non-Hispanic	63.2	34.4	2.4
Hispanic	53.5	44.1	2.4
Socioeconomic status 1980			
Bottom quartile	67.4	29.8	2.9
Middle quartiles	64.2	33.7	2.1
Top quartile	59.8	37.5	2.7

—Too few cases for a reliable estimate.
*Includes only those who had fewer than 6 months of postsecondary enrollment between degree attainment and February 1992, and whose highest credential by 1992 was a high school diploma, an associate's degree, or a bachelor's degree.

NOTE: Percentages may not sum to 100 due to rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School & Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

ANALYSIS OF CONTINUITY OF EARLY EMPLOYMENT AFTER ADJUSTING FOR BACKGROUND VARIATION

So far this report has focused on the proportions of 1980 high school sophomores who were continuously employed among various groups of recent graduates without taking into account the covariation of the independent variables. Among those with a high school education, for example, black, non-Hispanic graduates were shown to be less likely than white, non-Hispanic graduates to be continuously employed after high school. This finding, however, does not take into account the relationship of race–ethnicity and other variables, such as SES. Non-Hispanic blacks tend to have lower SES than whites, and SES is also negatively associated with continuous employment. Thus, examining how race–ethnicity and SES are associated with employment without considering the relationship of race–ethnicity and SES to each other may provide misleading results.

Several statistical methods are available to examine the relationship between two variables while holding other variables constant. This section of the report uses linear regression models to describe the relationship of a number of background and academic characteristics to continuity of early employment, while adjusting for the covariation of the independent variables.[19] The early employment status variables were constructed separately for high school diploma, associate's degree, and bachelor's degree recipients. Thus, three separate models are discussed, one for each level of educational attainment in the study. Results are presented first for those with a high school education, while the following sections discuss results for associate's and bachelor's degree recipients.

High School Graduates

Table 10 presents the results of a linear regression model for those with a high school education.[20] The independent variables entered in the model were gender; race–ethnicity; SES; 1982 ability test score; high school GPA; high school program; number of hours worked for pay in 11th grade; 1984 marital status; and having children by 1984. The proportions of each group who were continuously employed after high school graduation, without adjusting for covariation, are shown in column 1. An asterisk indicates that a given category was significantly more or less likely than the base comparison group (shown in italics for each characteristic) to be continuously employed. For example, column one shows that about 18 percent of non-Hispanic blacks were continuously employed, proportionally fewer than 33 percent of non-Hispanic whites.

The second column shows the proportion of those in each category who were continuously employed after controlling for the variation introduced by the other variables in the equation. Again, an asterisk indicates a statistically significant difference between the reference category and the base comparison group. To continue with the example above, one can see that there is no longer a difference between non-Hispanic blacks and non-Hispanic whites once the other variables in the equation are taken into account.

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[19]See appendix B for a detailed discussion of the technique used in this section.

[20]The R-squared of the equation (a statistic that measures the proportion of total variation in the dependent variable that is explained by the independent variables in the model) was 0.10. The F statistic, which tests whether the entire equation explains a statistically significant proportion of variance in the percentage of high school graduates who were continuously employed, was 7.79, statistically significant at the 0.01 level.

Table 10—Percentage of 1980 high school sophomores whose highest credential by 1992 was a high school diploma[1] who were continuously employed throughout the first 18 months after high school graduation, and the adjusted percentage after taking into account the covariation of the variables listed in the table[2]

	Unadjusted percentage[3]	Adjusted percentage[4]	WLS coefficient[5]	Standard error[6]
Total	29.1	29.1	55.9	2.7
Gender				
Male	35.3	34.9	†	†
Female	22.3*	23.3*	-11.6	1.7
Race–ethnicity				
Native American/Alaskan Native	22.6	23.2	-7.4	10.9
Asian/Pacific Islander	16.4	20.2	-10.5	10.7
Black, non-Hispanic	17.6*	23.2	-7.5	4.7
White, non-Hispanic	32.5	30.6	†	†
Hispanic	21.2*	24.1	-6.6	4.9
Socioeconomic status 1980				
Bottom quartile	23.0*	24.6*	-7.3	3.0
Middle quartiles	33.1	31.8	†	†
Top quartile	29.3	27.6	-4.2	3.0
Test score composite 1982				
Bottom quartile	22.9*	25.5	-5.2	3.1
Middle quartiles	32.3	30.8	†	†
Top quartile	34.2	29.2	-1.5	3.0
Grade point average in high school				
Mostly A's	37.4	38.3*	9.5	3.7
Mostly B's	34.7	33.8*	5.0	2.5
Mostly C's	33.0	28.8	†	†
Mostly D or lower	20.4*	18.2*	-10.6	3.1
Program in high school				
General	27.6	28.8*	-6.5	2.9
Academic	26.7	24.8*	-10.6	2.9
Vocational	31.2	35.4	†	†
Number of hours worked in 11th grade				
None	20.5*	21.1*	-16.2	2.3
1–14 hours per week	27.7*	25.5*	-11.8	2.5
15–29 hours per week	38.6	37.3	†	†
30 or more hours per week	40.4	39.0	1.7	3.3
Marital status as of February 1984				
Never married	30.0	28.5	†	†
Divorced/widowed/separated	9.2*	12.6	-16.0	9.6
Married or cohabit as married	28.5	33.3	4.8	3.0

Table 10—Percentage of 1980 high school sophomores whose highest credential by 1992 was a high school diploma[1] who were continuously employed throughout the first 18 months after high school graduation, and the adjusted percentage after taking into account the covariation of the variables listed in the table[2]—Continued

	Unadjusted percentage[3]	Adjusted percentage[4]	WLS coefficient[5]	Standard error[6]
Had a child as of February 1984				
Yes	19.2*	19.6*	-10.8	3.4
No	32.1	30.3	†	†

*$p \leq .05$.
†Not applicable for reference group.

[1]Includes only those who had fewer than 6 months of postsecondary enrollment between degree attainment and February 1992.
[2]The group in italics for each variable is the reference group for comparison.
[3]Estimates from the HS&B Data Analysis System.
[4]Percentages adjusted for differences associated with other variables in the table (see appendix B for details).
[5]Weighted least squares (WLS) coefficient (see appendix B for details). Note that the coefficients presented here were multiplied by 100 in order to represent the proportional difference between each category and its base comparison group.
[6]Standard error of WLS coefficient, adjusted for design effect (see appendix B for details).

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School & Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

Reversals in effects can also be seen among some academic characteristics included in the model. For example, before adjusting for the other variables, graduates with 1982 test scores in the bottom quartile were less likely than those with test scores in the two middle quartiles to be continuously employed after high school. This difference disappeared after accounting for covariation. High school grades, on the other hand, continued to show the strong relationship to employment continuity found before taking the other variables into account. Those who earned mostly D's and F's in high school were less likely than their peers who earned mostly C's to be continuously employed after high school. Additionally, earning mostly A's or B's became positively associated with continuous employment after controlling for the effects of the other variables.

High school graduates who participated in a vocational program in high school were more likely to be continuously employed than those who took a general or academic program, after adjusting for background variation. This finding seems to indicate that, net of other effects, vocational track classes may improve the labor market success of non-college-bound high school graduates. Caution must be exercised in interpreting this finding, however. Since program in high school was reported by the students themselves, the number of courses taken and the content of those courses may vary across schools and students according to what constitutes a "vocational program of study."

For several other variables in the model, differences that were statistically significant before adjusting for covariation continued to be significant after the adjustment. Women were less likely to be continuously employed than were men, for example, even after controlling for the effects of other variables in the model, such as early childbearing, which was more prevalent among women and also associated with less stable employment. Likewise, those in the lowest SES quartile were less likely than those in the two middle quartiles to be continuously employed, even after accounting for the other variables in the model.

Working fewer than 15 hours per week in the 11th grade (as opposed to working 15–29 hours per week) continued to have a negative effect on continuity of employment following high school graduation after controlling for the other variables in the equation. Those who had a child by 1984 were also less likely to be continuously employed after high school graduation than those who delayed childbearing, even after controlling for gender, race–ethnicity, SES, and academic performance. However, being divorced, widowed, or separated was no longer negatively associated with continuous employment compared with having never married after taking into account the other variables.

Postsecondary Graduates

Linear regression models were also run to control for variation among independent variables relative to the continuity of associate's and bachelor's degree recipients' early employment. The independent variables entered in the models were gender; race–ethnicity; SES; 1982 ability test score; undergraduate GPA; major field of concentration; 1984 marital status; and having children by 1984.

Among associate's degree holders, the only variables discussed in the report that had a significant relationship with being continuously employed after graduation without adjusting for covariance were 1982 test score and major field of study (tables 4 and 7). However, when controlling for covariance among the variables, neither major, test score, nor any other variable in the equation had a significant relationship with the proportion of associate's degree recipients who were continuously employed. Moreover, the R-squared of the equation was 0.07, a very small proportion. The F statistic was 0.15, much too small to be significant.[21] This suggests that the variables included had virtually no relationship with the continuity of associate's degree holders' early employment.

[21]Tables showing regression equations for associate's and bachelor's degree recipients are not included in the report, since the results were not significant.

Previously in this report the proportions of associate's degree holders who were continuously employed often appeared to differ according to various characteristics (for example, undergraduate grades), but the standard errors of the estimates were large and there was no statistical evidence of meaningful differences between categories. The means adjustment reveals that even after controlling for the effects of the other variables there are still no meaningful differences in the proportions of various groups of associate's degree recipients who were continuously employed.

The third model, estimated for bachelor's degree recipients, yielded similar findings. Without adjusting for covariation, none of the variables discussed in this report were related to bachelor's degree recipients' early employment status. When the same variables as in the associate's degree model were entered into the model for bachelor's degree recipients, none were found to have a significant relationship with early employment, the R-squared of the equation was 0.03, and the F-test yielded a nonsignificant value of 0.84. These results indicate that attainment of an associate's or bachelor's degree may mitigate the relationships of certain characteristics with employment patterns found for the high school graduates, including being female, being from a low-SES background, having low grades, or having children at an early age.

LONG-TERM EMPLOYMENT PATTERNS

This section explores how the 1991 and 1992 labor market experiences of secondary and postsecondary graduates were related to their patterns of initial employment. In the discussion that follows, the individual educational attainment groups are compared, as well as the long-term labor market outcomes of those with different early employment experiences. The results indicate that a few of the long-term outcomes examined were associated with initial labor market experiences, including both 1991 annual earnings and receiving employer-provided training in 1991–92.

AVERAGE EARNINGS

Interpretation of HS&B Fourth Follow-up earnings data is complicated by the fact that dollar amounts represent the 1991 annual income of individuals, but do not indicate the intensity of their work (i.e., full-time or part-time employment) or its duration. Thus, compared with those with higher earnings, members of a group with a lower average income may have worked fewer hours per week, worked fewer weeks in 1991, or have earned less for similar hours of work.

By 1992, the HS&B graduates with bachelor's degrees had been in the labor market for an average of 5 years, associate's degree recipients an average of 6 years, and high school graduates an average of 8 years.[22] The results indicate that even if a high school graduate in this cohort were rewarded with higher wages for time spent in the labor force, on average, the financial benefits of education outweighed that reward (table 11). For instance, those who had a high school education earned about $19,000, associate's degree recipients about $22,500, and bachelor's degree recipients about $27,800.[23]

At all education levels, men consistently reported higher 1991 earnings than women. Among those with a high school education, men earned $22,300, while women earned $14,600

[22]U.S. Department of Education, National Center for Education Statistics, High School & Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

[23]A rigorous calculation of the financial benefit of earning an associate's or bachelor's degree would take into account a number of factors besides wages, including the cost of schooling and the wages forgone while studying.

Table 11—Average annual earnings in 1991 of 1980 high school sophomores who had any earnings in 1991,[1] by degree, gender, and employment status in the first 18 months after highest degree attainment

	Average annual earnings in 1991		
	Total	Men	Women
		High school diploma	
Total	$19,079	$22,303	$14,578
Continuously employed	21,665	24,158	16,451
Sporadically employed	18,458	21,762	14,382
Not employed	15,689	18,905	12,630
		Associate's degree	
Total[2]	22,493	25,433	20,408
Continuously employed	22,109	24,542	20,357
Sporadically employed	20,836	24,796	18,122
Not employed	—	—	—
		Bachelor's degree	
Total	27,802	30,579	24,858
Continuously employed	28,577	31,465	25,455
Sporadically employed	26,937	29,387	24,341
Not employed	—	—	—

—Too few cases for reliable estimate.
[1]Includes only those who had fewer than 6 months of postsecondary enrollment between degree attainment and February 1992, and whose highest credential by 1992 was a high school diploma, an associate's degree, or a bachelor's degree.
[2]Estimates in total row are higher than estimates shown for subgroups due to several cases of not-employed associate's degree recipients reporting 1991 earnings of $200,000 or more.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School & Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

(table 11). Among those with associate's degrees, men earned $25,400, compared with $20,400 for women; comparable figures for college graduates were $30,600 and $24,900, respectively. In many cases, women's lower earnings may have been a consequence of their spending fewer weeks in the labor force or fewer weeks working full time in 1991. Indeed, Current Population Survey data on workers aged 25–34 in March 1995 show that women were three times as likely as men in their age group to work part time (22 percent versus 7 percent), and that 30 percent of women worked only part of the year, compared with 21 percent of men.[24] On the other hand, re-

[24]U.S. Department of Education, National Center for Education Statistics, *The Condition of Education 1996* (Washington, DC: 1996), Indicator 33.

cent data on college graduates show that, even after controlling for intensity of employment and for major field of study, women had significantly lower starting salaries than did men.[25]

Among new graduates whose highest credential was a high school diploma, 1991 earnings were related to their initial labor market experiences. Individuals who were continuously employed throughout the first 18 months following graduation earned approximately $21,700 in 1991, while those who were sporadically employed earned $18,500 and those who were not employed earned $15,700 (table 11). Among bachelor's degree recipients, those who were continuously employed earned over $1,000 more in 1991 than those who were sporadically employed after graduation. A similar gap of $1,300 was observed across subgroups of associate's degree recipients, but large standard errors preclude determination of whether this income difference is real or a statistical artifact.

JOB SATISFACTION[26]

Educational attainment had some bearing on how satisfied 1980 high school sophomores were with their jobs in 1992. On a standardized scale of 0 to 100, those whose highest degree was a high school diploma tended to report slightly lower job satisfaction ratings for their current or most recent job in 1992 (50.0), on average, than those with associate's degrees (54.6) or bachelor's degrees (53.9) (table 12).

High school graduates who were continuously employed in the first 18 months after graduation had higher job satisfaction ratings in 1992 (53.9), on average, than those who were initially sporadically employed (48.8) or not employed (46.7) (table 12). Likewise, continuously employed associate's degree recipients had higher job satisfaction ratings (58.0) than their counterparts who were sporadically employed (50.5). However, no significant differences were noted among bachelor's degree holders according to their early labor market experiences.

[25]Ibid., Indicator 35.

[26]Job satisfaction is a composite scale reflecting the number of positive responses to eight questions about workers' satisfaction with various aspects of their jobs. Workers reported their satisfaction with pay and benefits; job challenge and importance; working conditions; opportunities for career advancement; job security; supervisor; relationships with co-workers; and educational opportunities.

Table 12—Average 1992 job satisfaction rating among 1980 high school sophomores,[1] by degree and employment status in the first 18 months after highest degree attainment[2]

	Job satisfaction
	High school diploma
Total	50.0
Continuously employed	53.9
Sporadically employed	48.8
Not employed	46.7
	Associate's degree
Total	54.6
Continuously employed	58.0
Sporadically employed	50.5
Not employed	—
	Bachelor's degree
Total	53.9
Continuously employed	54.7
Sporadically employed	52.1
Not employed	57.0

—Too few cases for a reliable estimate.
[1]Includes only those who had fewer than 6 months of postsecondary enrollment between degree attainment and February 1992, and whose highest credential by 1992 was a high school diploma, an associate's degree, or a bachelor's degree.
[2]Job satisfaction is a composite scale ranging from 0 to 100 which reflects the number of positive responses to eight questions about workers' satisfaction with various aspects of their jobs. Workers reported their satisfaction with pay and benefits; job challenge and importance; working conditions; opportunities for career advancement; job security; supervisor; relationships with co-workers; and educational opportunities.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School & Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

OCCUPATION

About 27 percent of 1980 high school sophomores who attained a high school diploma as their highest credential were working as laborers in 1991, more than twice the proportion of associate's degree recipients (10 percent) or bachelor's degree recipients (3 percent) so employed (table 13). While another 20 percent of high school graduates and 18 percent of associate's degree holders were craftsmen, skilled operators, or technicians, there was some evidence that

Table 13—Percentage distribution of 1991 occupations among 1980 high school sophomores,[1] by degree and employment status in the first 18 months after highest degree attainment

	Clerical	Craftsman/ skilled operative/ technical	Farmer	Laborer	Manager/ admin-istrator	Military/ protective service	Profes-sional/ school teacher	Business owner	Sales	Service
					High school diploma					
Total	15.0	19.9	0.8	26.6	12.8	3.5	3.7	2.4	5.6	9.6
Continuously employed	15.1	20.8	1.5	25.0	15.8	2.3	2.7	2.8	5.5	8.5
Sporadically employed	15.6	18.2	0.3	27.6	13.4	4.3	3.6	2.1	6.2	8.6
Not employed	12.6	23.7	1.0	26.3	5.0	3.6	6.2	2.5	3.9	15.2
					Associate's degree					
Total	23.6	17.9	1.3	9.5	19.0	2.0	14.1	0.9	4.4	7.4
Continuously employed	24.6	19.9	1.8	7.2	20.2	2.8	15.8	0.3	3.4	4.1
Sporadically employed	20.4	16.9	0.8	12.2	18.4	0.2	13.2	0.9	6.3	10.6
Not employed	—	—	—	—	—	—	—	—	—	—
					Bachelor's degree					
Total	12.7	12.8	0.2	2.9	24.9	3.8	31.4	1.7	8.0	1.6
Continuously employed	12.0	11.4	0.3	2.9	25.2	4.9	31.1	2.2	8.3	1.7
Sporadically employed	13.6	15.2	0.0[2]	2.2	24.9	2.0	32.3	1.0	7.5	1.4
Not employed	—	—	—	—	—	—	—	—	—	—

—Too few cases for a reliable estimate.

[1]Includes only those who had fewer than 6 months of postsecondary enrollment between degree attainment and February 1992, and whose highest credential by 1992 was a high school diploma, an associate's degree, or a bachelor's degree.

[2]Estimate is between 0.005 and 0.05.

NOTE: Percentages may not sum to 100 due to rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School & Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

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bachelor's degree recipients (13 percent) were less likely to hold this occupation.[27] Finally, whereas 4 percent of high school graduates had professional occupations in 1991, 14 percent of those with associate's degrees and 31 percent of bachelor's degree holders had such jobs.

In general, initial labor market experiences seemed to have little relation to occupation in 1991. Among 1980 high school sophomores whose highest level of educational attainment was a high school diploma, those who were continuously employed in the first 18 months after graduation were as likely to work as laborers in 1991 as those who had not been employed (table 13). Similarly, among bachelor's degree recipients, regardless of initial labor market experiences, about one-third (31 to 32 percent) were in professional occupations in 1991.

EMPLOYER-PROVIDED TRAINING[28]

As educational attainment level increased, so did the likelihood of 1980 high school sophomores reporting employer-provided training in 1991–92. Specifically, one-third of those with a high school education had received such training in 1991–92, compared with 43 percent of their peers with associate's degrees and 59 percent with bachelor's degrees (table 14). To test for the possibility that graduates at various education levels had a different likelihood of being trained because they tended to have different occupations (see above), the percentage of those in various occupations who received training was calculated, controlling for educational attainment (table 15). This analysis reveals that bachelor's degree recipients were more likely to receive training than high school graduates in a number of the more prevalent occupations, including clerical, craftsman or operator, and professional jobs.

Continuity of early employment was related to receiving employer-provided training in 1991–92. For example, continuously employed high school graduates were more likely to receive employer-provided training in 1991–92 than were their peers who were not initially employed (38 versus 26 percent) (table 14). In addition, there was some evidence that among bachelor's degree recipients, those who were continuously employed (62 percent) were more likely than those with less stable early employment histories to receive such training (42 to 55 percent).[29]

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[27]The difference between associate's and bachelor's degree recipients was significant at the 0.10 level but not at the conventional 0.05 level.

[28]Includes any training referred to in response to the 1992 Fourth Follow-up survey question, "During the last 12 months, have you received employer-provided training?", and to further items regarding the duration of the training and its content.

[29]These differences were significant at the 0.10 level but not at the conventional 0.05 level.

Men and women at all levels of education had about the same likelihood of receiving employer-provided training (table 14). However, the duration of men's and women's training differed. Men were more likely than women to have been trained for 6 months or more among those who had a high school education and also among bachelor's degree recipients in the study.

Table 14—Percentage of 1980 high school sophomores* who received employer-provided training in 1991–92, and of those who received training, the number of weeks the training lasted, by degree, employment status in the first 18 months after highest degree attainment, and gender

	Received employer-provided training	Of those who received training, number of weeks training lasted			
		1 week or less	1 to 4 weeks	4 weeks to 6 months	More than 6 months
		High school diploma			
Total	32.9	27.9	35.4	26.5	10.2
Employment status					
Continuously employed	37.8	26.6	35.1	29.1	9.2
Sporadically employed	32.7	27.6	34.7	26.9	10.8
Not employed	25.5	32.1	38.8	18.9	10.3
Gender					
Male	34.6	26.2	32.3	28.3	13.2
Female	31.0	30.0	39.2	24.4	6.5
		Associate's degree			
Total	43.3	34.3	35.5	24.8	5.4
Employment status					
Continuously employed	51.0	27.8	40.9	24.7	6.6
Sporadically employed	34.1	45.7	27.2	23.4	3.7
Not employed	—	—	—	—	—
Gender					
Male	47.4	28.5	34.6	28.7	8.2
Female	40.5	38.8	36.1	21.8	3.3
		Bachelor's degree			
Total	59.0	31.2	39.1	21.7	8.0
Employment status					
Continuously employed	61.8	30.0	38.0	23.8	8.3
Sporadically employed	55.4	32.5	41.3	18.4	7.8
Not employed	41.9	—	—	—	—
Gender					
Male	60.7	25.4	41.7	22.9	10.0
Female	57.3	37.4	36.3	20.3	5.9

—Too few cases for a reliable estimate.

*Includes only those who had fewer than 6 months of postsecondary enrollment between degree attainment and February 1992, and whose highest credential by 1992 was a high school diploma, an associate's degree, or a bachelor's degree.

NOTE: Percentages may not sum to 100 due to rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School & Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

Table 15—Percentage of 1980 high school sophomores who received employer-provided training in 1991–92 by occupation, by educational attainment[1]

	All occupations[2]	Clerical	Craftsman/ skilled operative/ technical	Farmer	Laborer	Manager/ administrator	Military/ protective service	Professional/ school teacher	Business owner	Sales	Service
Total	46.8	47.9	47.9	14.1	31.3	54.6	70.5	58.9	18.2	46.8	32.9
High school diploma	36.4	39.8	41.4	—	30.0	46.8	54.6	32.6	9.9	40.2	26.3
Associate's degree	45.9	39.2	49.6	—	44.3	45.4	—	57.6	—	—	34.9
Bachelor's degree	61.0	59.0	66.1	—	46.5	64.2	86.7	57.4	16.5	63.0	58.2

—Too few cases for a reliable estimate.
[1]Total row includes entire HS&B cohort. Degree category rows include only those who had fewer than 6 months of postsecondary enrollment between degree attainment and February 1992, and whose highest credential by 1992 was a high school diploma, an associate's degree, or a bachelor's degree.
[2]Estimates differ from table 14 because of differences in missing data patterns.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School & Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

SUMMARY

Most young people enter a transitional period after graduating from high school or attaining a postsecondary degree. While some new graduates work steadily for a period immediately after their departure from school, others may look for work, or be involved in non-labor force related activities such as traveling, caring for their family, or taking classes. In keeping with the literature, this study has found that associate's and bachelor's degree recipients tended to work more consistently during the first 18 months after earning their degree than high school diploma recipients did after graduation.

Controlling for educational attainment, some demographic characteristics (such as gender, race–ethnicity, marriage, and childbearing) were found to be associated with initial labor market experiences among high school graduates, but not related to the early employment of associate's or bachelor's degree recipients. Data also suggest that high school graduates who did not work while attending high school, who had lower than average grades, who had taken fewer course credits in high school, who were from lower SES backgrounds than the rest of their cohort, or who had children by 1984 were less likely than their peers to be employed immediately after graduating. Several other factors, including race–ethnicity, high school test scores, and 1984 marital status, were found to be related to early employment in the tabular analyses but were no longer significant after controlling for the other variables. The associations between initial labor market experiences and demographic characteristics were not generally apparent among postsecondary graduates.

Many labor market experiences five to ten years after most graduates had finished their schooling were related to educational attainment. Earnings in 1991, occupation in 1991, job satisfaction in 1992, and the likelihood of receiving employer-provided training were all positively associated with level of education. In addition, men received higher earnings than women at all attainment levels.

Several aspects of long-term labor market experience were associated with early employment continuity, but not always for those at every educational attainment level. For example, job satisfaction was positively associated with continuity of early employment only for those whose highest level of education was a high school diploma or associate's degree. Income in 1991 was associated with early employment for both the high school educated and college graduate groups,

though results for associate's degree recipients were inconclusive. Occupation, on the other hand, was not associated with initial labor market experiences for those at any of the attainment levels examined.

APPENDIX A—GLOSSARY

This glossary describes the variables used in this report. These items were taken directly from the HS&B Fourth Follow-up Data Analysis System (DAS), an NCES software application that generates tables directly from Fourth Follow-up data files. A description of the DAS files can be found in appendix B.

The following is a list of variables that appear in this report and the glossary page numbers on which they can be found. The variables are organized within each category in alphabetic order by item name. The labels in parentheses at each entry correspond to the names of the variables in the DAS.

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EMPLOYMENT VARIABLES

Annual earnings in 1991 **(Y4301B9)**

Earnings are stored as a continuous variable. Earnings were reported by respondents on an annual basis from 1983 through 1991.

Employment status after high school **(STWHS18)**

This variable describes the employment status after high school graduation of 1980 high school sophomores whose highest degree attainment by 1992 was a high school diploma. Respondents who attended a postsecondary institution for 6 months or more between graduation and February 1992, but earned no further credentials, were excluded from the study. However, 63 respondents were missing at least one monthly employment/enrollment status indicator and showed 5 or fewer months of postsecondary enrollment on the indicators that existed. These cases were included in the study. Degree attainment was self-reported (HGHDG92).[1]

Continuously employed	Respondent was continuously employed throughout the first 18 months after degree completion, and may also have been enrolled in a postsecondary institution for up to 5 months during the period.
Sporadically employed	Respondent worked more than 2 but less than 18 months immediately following degree completion, and may also have been enrolled in a postsecondary institution for up to 5 months during the period.
Not employed	Respondent was employed for 2 or fewer months during the 18 months following highest degree completion, and may have been enrolled for up to 5 months during this period.

Employment status after associate's degree **(STWAA2)**

This variable describes the employment and enrollment status after associate's degree attainment of 1980 high school sophomores whose highest degree attainment by 1992 was an associate's degree. Respondents who attended a postsecondary institution for 6 months or more between de-

[1] Note that this definition of "high school educated" 1980 high school sophomores differs from that used in the report: U.S. Department of Education, National Center for Education Statistics, "Early Labor Market Difficulty and a Sub-Baccalaureate Education," (Washington, DC), forthcoming. This report uses self-reported data to describe educational attainment, while the forthcoming report uses postsecondary transcript (PETS) data.

gree attainment and February 1992 were excluded from the study. Degree attainment was self-reported (HGHDG92). Categories for this variable are identical to those for "Employment status after high school (STWHS18)," given above.

Employment status after bachelor's degree **(STWBA2)**

This variable describes the employment and enrollment status after college graduation of 1980 high school sophomores whose highest degree attainment by 1992 was a bachelor's degree. Respondents who attended a postsecondary institution for 6 months or more between degree attainment and February 1992 were excluded from the study. Degree attainment was self-reported (HGHDG92). Categories for this variable are identical to those for "Employment status after high school (STWHS18)," given above.

Job satisfaction **(JOBSAT92)**

This variable is a composite of eight items from the fourth follow-up survey. Respondents were asked about their satisfaction with the following aspects of their job: its importance and challenge, its working conditions, the opportunity for promotion and advancement, the opportunity for further education and training, its security and permanence, their supervisor, relationships with co-workers, and its pay and benefits. Positive responses were counted and converted to percentile ranks (from 0 to 100).

Number of weeks training lasted **(Y4308A)**

On the fourth follow-up survey, respondents who said they had received employer-provided training in the last 12 months were asked the total number of weeks this training lasted. Possible responses to the survey were as follows:

1 week or less
1 to 4 weeks
4 weeks to 6 months
More than 6 months

Occupation in 1991 **(Y4303F9)**

The occupation variable contains 29 categories, not all of which are shown in the tables of this report. These 29 categories can be collapsed to the 16 standard Dictionary of Occupational Titles (DOT) categories that were used to record father's, mother's, and respondent's occupation in

earlier surveys. For this report the full 29 categories were collapsed into 11 categories, shown below.

Clerical	Includes secretary, typist, file clerk, receptionist, word processor, bookkeeper, bank teller, ticket agent, mail carrier, meter reader, shipping and receiving, telephone operator, library clerk, office machine operator, messenger, dispatcher.
Craftsman/skilled operative/technical	Includes baker, auto mechanic, machinist, plumber, house painter, carpenter, brick mason, telephone installer, other unspecified mechanics, tile setter, carpet installer, roofer, truck driver, assembler, machine operator, welder, inspector, bus driver, forklift operator, train engineer, cab driver, chauffeur, sewing machine operator, printing press operator, programmer, computer technician, systems analyst, draftsperson, medical/dental technician.
Farmer/farm manager	Includes farmer, horticulturist, gardener, groundskeeper, trapper, fish farmer, fisherman, oysterman, farm manager.
Homemaker	No other outside job.
Laborer	Includes construction worker, car washer, sanitary worker, farm laborer, machine cleaner, stock handler, bagger, loader, stevedore, tradesperson's helper, gas station attendant, handyperson.
Manager/administrator	Includes sales manager; buyer; local, state, or federal government manager or administrator; store, restaurant, or hotel manager or administrator; line supervisor; other manager or administrator.
Military/protective service	Includes detective, police, fire fighter, security guard, crossing guard, FBI agent.
Professional/school teacher	Includes actor, artist, writer, athlete, designer, editor, disc jockey, publicist, photographer, nurse, social worker, engineer, physician, legal professional, other professional, elementary or secondary school teacher.

Business owner	Includes proprietor or owner of a store, restaurant, hotel, or motel; construction contractor; other business owner.
Sales	Includes salesperson, advertising or insurance agent, real estate broker, counter help, cashier.
Service	Includes barber, beautician, janitor, waiter, practical nurse, nurse's aide, maid, orderly, cook, kitchen help, exterminator, flight attendant.

Received employer-provided training **(Y4306)**

From an item on the fourth follow-up survey which asks, "During the last 12 months, have you received employer-provided training?" This item was asked of all respondents, regardless of their employment status in the previous 12 months.

HIGH SCHOOL VARIABLES

Control of high school **(HSTYPE)**

Public	Student attended a public high school in 10th grade.
Private or parochial	Student attended a private or parochial high school in 10th grade.

Credits in academic areas **(CTI)**

Number of credits taken in various subject areas according to high school transcript data. Courses were coded into subject areas using the Secondary School Taxonomy (SST). This variable counts the number of credits taken in all academic subjects, including mathematics, science, English, social studies, fine arts, and foreign languages.

Credits in English **(CTI3)**

Number of credits taken in English according to high school transcript data. Courses were coded into subject areas using the Secondary School Taxonomy (SST). This variable counts the number of credits taken in survey and skills areas, as well as in literature, composition and writing, and speech.

Credits in mathematics **(CTI1)**

Number of credits taken in mathematics according to high school transcript data. Courses were coded into subject areas using the Secondary School Taxonomy (SST). This variable counts the number of credits taken in basic (remedial) math, general math, applied math, pre-algebra, algebra, geometry, other advanced math, and advanced calculus.

Credits in vocational areas **(CTII)**

Number of credits taken in vocational areas according to high school transcript data. Courses were coded into subject areas using the Secondary School Taxonomy (SST). This variable counts the number of credits taken in agriculture, business, marketing and distribution, health, occupational home economics, trade and industry, and technical and communication areas.

Grades in high school **(SST_GPA)**

Grade point average (GPA) was calculated from high school transcripts. All grading systems were standardized to a 4.0 scale.

Mostly A's	Cumulative high school GPA was 3.50 or higher.
Mostly B's	Cumulative high school GPA was between 2.80 and 3.49.
Mostly C's	Cumulative high school GPA was between 1.80 and 2.79.
Mostly D or lower	Cumulative high school GPA was lower than 1.80.

Number of hours worked in 11th grade **(FY37)**

The first follow-up survey asked students in their senior year of high school the following: "During the school year before this one, about how many hours per week on the average did you work for pay outside your own home?"

None
1– 14 hours per week
15–29 hours per week
30 or more hours per week

Program in high school **(HSPROG)**

General	Students reported that their high school program was neither vocational nor academic.
Academic	Students reported that their high school program was academic.
Vocational	Students reported that their high school program was vocational.

Test score composite 1982 **(FUTEST)**

FUTEST in the fourth follow-up survey is a percentile composite based on the variable FUTEST from the first follow-up in 1982. Originally, this variable was coded as a standard normal variable with a zero mean and a variance of 1, and was a composite score based on the average nonmissing reading, vocabulary, and mathematics (part 1) test scores. The original standardized test score composite was converted to a percentile format by ranking students on an index that ranged from 1 to 100. These percentiles were then grouped into quartiles:

Bottom quartile	Students whose percentile rank ranged from 1 to 25 percent.
Middle quartiles	Students whose percentile rank ranged from 26 to 75 percent.
Top quartile	Students whose percentile rank ranged from 76 to 100 percent.

Total credits **(SST_TOT)**

Total number of credits taken according to high school transcript data.

POSTSECONDARY EDUCATION VARIABLES

Business credits **(BUSCRD)**

Number of postsecondary credits earned in business courses, including agribusiness, business and management, and specialized marketing and distribution. From the transcript analysis file HSTUPETS dated 8/6/96.

Calculus and advanced math credits **(MTHCRD3)**

Number of postsecondary credits earned in calculus and advanced math courses, including advanced statistics, applied calculus, advanced math topics, and engineering mathematics. From the transcript analysis file HSTUPETS dated 8/6/96.

Computer-related credits **(CRELCRD)**

Number of postsecondary credits earned in computer-related courses, including business data programming, office software, computer science, computer education, and computer electronics repair. Note that this variable includes all courses counted in COMSCRD. From the transcript analysis file HSTUPETS dated 8/6/96.

Date of degree attainment **(HSDEGDTE, ATTDEGB, and ATTDEGC)**

For high school graduates, provides self-reported date of high school graduation (HSDEGDTE). For associate's and bachelor's degree recipients, provides date of degree attainment based on a combination of self-report and postsecondary transcript data (ATTDEGB and ATTDEGC, respectively).

Grades in postsecondary education **(GPA)**

Cumulative undergraduate grade point average, standardized to a 4.0 scale. From the transcript analysis file HSTUPETS dated 8/6/96.

Mostly A's	Cumulative undergraduate GPA was 3.50 or higher.
Mostly B's	Cumulative undergraduate GPA was between 2.80 and 3.49.
Mostly C or lower	Cumulative undergraduate GPA was lower than 2.80.

Humanities credits **(HUMCRD)**

Number of postsecondary credits earned in humanities courses, including foreign languages, English/literature in English, philosophy, religious studies, and art history. From the transcript analysis file HSTUPETS dated 8/6/96.

Remedial courses **(REMCRSE)**

Number of remedial postsecondary courses taken in all subjects, including remedial English, English as a second language, pre-collegiate math, business math, and survival skills. From the transcript analysis file HSTUPETS dated 8/6/96.

Type of start in postsecondary education **(PSESTART)**

This variable describes the timing of the 1980 high school sophomores' first enrollment in a postsecondary institution. It was based on monthly postsecondary enrollment indicators.

Enrolled October 1982 or earlier
Enrolled November 1982 or later

Undergraduate major (associate's degree) **(AAMJR)**

Major field of study for those students whose highest credential by 1992 was an associate's degree. From the transcript analysis file HSTUPETS dated 8/6/96.

Business	Includes agribusiness and production, accounting, finance, operations research, business administration and management, human resource development, marketing and distribution, retail merchandising, and hospitality management.
Business support	Includes secretarial/clerical and other business support.
Computers and technical	Includes computer programming, information management, computer and information science, architecture or environmental design, precision production, engineering, and engineering technology.
Health occupations	Includes dental/medical technician, physical or other therapies, health/physical education/recreation, practical nursing, general and other allied health, radiological technician, speech pathology or audiology, clinical health sciences, dentistry, medicine, nursing, health/hospital administration, public health, nutrition/food science, and other health sciences.

General/liberal studies	Includes liberal or general studies, American studies, area studies, ethnic studies, foreign languages, English or American literature, creative or technical writing, all other letters, interdisciplinary humanities, general social science, philosophy, religious studies, psychology, public administration, anthropology, economics, geography, history, sociology, demography or crime studies, political science, and international relations.
Other	Includes agriculture, animal or plant science, math, women's studies, environmental science, biopsychology, integrated/general science, biological sciences, physical sciences, graphics/printing, industrial design, fine and performing arts, print or broadcast journalism, communications, communication technology, consumer services, education, home economics, pre-law, law, library or archival science, military science and technology, recreation, basic/personal skills, theology, industrial arts, mechanics, and transportation.

Undergraduate major (bachelor's degree) **(BAMJR)**

Major field of study for those students whose highest credential by 1992 was a bachelor's degree. From the transcript analysis file HSTUPETS dated 8/6/96.

Business	Includes accounting, finance, operations research, business administration and management, human resource development, marketing and distribution, retail merchandising, and hospitality management.
Engineering, architecture, math, computer science	Includes architecture or environmental design, engineering, engineering technology, computer programming, information management, computer and information science, and math.
Biological and physical science	Includes physical sciences, agriculture, animal or plant science, biological sciences, environmental science, and biopsychology.
Health science and services	Includes dental/medical technician, physical or other therapies, health/physical education/recreation, practical nursing, general and other allied health, radiologic techni-

	cian, speech pathology or audiology, clinical health sciences, dentistry, medicine, nursing, health/hospital administration, public health, nutrition/food science, and other health sciences.
Arts and humanities	Includes foreign languages, English or American literature, creative or technical writing, all other letters, interdisciplinary humanities, philosophy, religious studies, industrial design, and fine and performing arts.
Social science	Includes American studies, area studies, ethnic studies, pre-law, law, women's studies, general social science, psychology, anthropology, economics, geography, history, sociology, demography or crime studies, political science, international relations, agribusiness and production, print or broadcast journalism, communications, home economics, recreation, and public administration.
Other	Includes education, library or archival science, secretarial/clerical, other business support, communication technology, consumer services, child care/guidance, vocational home economics, liberal or general studies, military science and technology, integrated/general science, basic/personal skills, theology, fire science, industrial arts, mechanics, graphics/printing, precision production, transportation, and all other fields.

DEMOGRAPHIC AND STATUS VARIABLES

Gender **(SEX)**

Male
Female

Had a child as of February 1984 **(SY65)**

The second follow-up survey asked respondents whether they had any children, including adopted, foster-care and stepchildren, as of the first week of February 1984.

Highest degree earned by 1992 **(HGHDG92)**

This variable is a composite that summarizes the highest degree attained by 1980 high school sophomores as of June 1992. The variable categories are mutually exclusive, so each student is

included in only one category. Students who did not earn a postsecondary certificate or degree may have attended a postsecondary institution at some time between 1982 and 1992, and students who earned a degree might have enrolled in an institution offering a higher degree than the one that they earned without completing the program by June 1992. Likewise, students in higher degree attainment categories may have also earned a lower degree as well, even though it is not reflected in this variable.

Less than high school diploma	Student did not complete high school.
High school diploma	Student completed high school.
Certificate	Student completed a vocational certificate, diploma, or award.
Associate's degree	Student completed an associate's degree.
Bachelor's degree	Student completed a bachelor's degree.
Advanced degree	Student completed a master's, professional, or doctoral degree.

Marital status as of February 1984 **(SY56)**

The second follow-up survey asked respondents their marital status as of the first week of February 1984.

Never married
Divorced/Widowed/Separated
Married or cohabit as married

Race–ethnicity **(RACE4)**

Native American/Alaskan Native	A person having origins in any of the original peoples of North America and who maintains cultural identification through tribal affiliation or community recognition.
Asian/Pacific Islander	A person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or Pacific Islands. This includes people from China, Japan, Korea, the Philippine Islands, Samoa, India, and Vietnam.

Black, non-Hispanic	A person having origins in any of the black racial groups of Africa, not of Hispanic origin.
White, non-Hispanic	A person having origins in any of the original peoples of Europe, North Africa, or the Middle East (except those of Hispanic origin).
Hispanic	A person of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish culture or origin, regardless of race.

Socioeconomic status **(BYSES)**

BYSES in the fourth follow-up is a percentile composite based on the variable BYSES from the 1980 base-year file. Originally, this variable was coded as a standard normal variable with a zero mean and a variance of 1, and was a composite score based on the average nonmissing values for father's occupation, father's education, mother's education, family income, and material possessions in the home. The original standardized status score composite was converted to a percentile format by ranking students on an index that ranged from 1 to 100. These percentiles were then grouped into quartiles:

Bottom quartile	Students whose percentile rank ranged from 1 to 25 percent.
Middle quartiles	Students whose percentile rank ranged from 26 to 75 percent.
Top quartile	Students whose percentile rank ranged from 76 to 100 percent.

APPENDIX B—TECHNICAL NOTES AND METHODOLOGY

THE HIGH SCHOOL AND BEYOND FOURTH FOLLOW-UP

The High School and Beyond (HS&B) survey began in the spring of 1980 with the collection of base-year questionnaire and test data on more than 58,000 high school seniors and sophomores. The first follow-up survey was conducted in the spring of 1982, the second follow-up in the spring of 1984, the third follow-up in the spring of 1986, and the fourth follow-up in the spring of 1992. Of the original 27,118 high school sophomores who participated in 1980, 10,530 (39 percent) participated in all four of the follow-up surveys.

The HS&B Fourth Follow-up Survey is the fifth wave of the longitudinal study, but unlike previous rounds, the fourth follow-up focused exclusively on the 1980 sophomore class. This survey included two components: a respondent survey with a sample of 14,825 members of the 1980 sophomore cohort, and a transcript study based on the 9,064 sophomore cohort members who reported postsecondary attendance. The goals of the fourth follow-up were to obtain information on issues of access to and choice of undergraduate and graduate educational institutions, persistence in attaining educational goals and progress through the curriculum, rates of degree attainment and of other educational outcomes, and the relationship between labor market outcomes and educational attainment and labor market experiences.

Sample design. In the base year, students were selected using a two-stage, stratified probability sample design with schools as the first-stage units and students within schools as the second-stage units.[1] The total of 1,122 schools were selected for the sample, from a frame of 24,725 schools with grades 10 or 12 or both. Within each stratum, schools were selected with probabilities proportional to the estimated enrollment in their 10th and 12th grades. Within each school, 36 seniors and 36 sophomores were randomly selected. In those schools with fewer than 36 seniors or 36 sophomores, all eligible students were used in the sample.

[1]For further details on the base-year sample design, see M. Frankel, L. Kohnke, D. Buonanno, and R. Tourangeau, *High School and Beyond Sample Design Report* (Chicago: National Opinion Research Center, 1981).

The first follow-up sophomore and senior cohort samples were based on the HS&B base-year samples, retaining the essential features of a stratified multi-stage design (for further detail see Tourangeau et al. 1983).[2] Subsequent to the first follow-up survey, high school transcripts were sought for a probability subsample of nearly 18,500 members of the 1980 Sophomore Cohort. The subsampling plan for the Transcript Study emphasized retaining members of subgroups with special relevance for education policy analysis. Compared with the base-year and first follow-up surveys, the Transcript Study sample design further increases the overrepresentation of racial and ethnic minorities (especially those with above average HS&B achievement test scores), students who attend private high schools, school dropouts, transfers and early graduates, and students whose parents participated in the base-year Parent's Survey on financing postsecondary education.

The samples for the second and third follow-up surveys of the 1980 Sophomore Cohort were based upon the transcript study design. A total of 14,825 cases were selected from among the 18,500 retained for the transcript study. As was the case for the transcript sample, the sophomore cohort second and third follow-up samples included disproportionate numbers of sample members from policy-relevant subpopulations (e.g., racial and ethnic minorities, students from private high schools, high school dropouts, students who planned to pursue some type of postsecondary schooling, and so on).[3] The members of the senior cohort who were selected for the second follow-up sample were the same as those selected for the first follow-up sample. The third follow-up was the last one conducted for the senior cohort.

The fourth follow-up was composed solely of members from the sophomore cohort, and these students were the same as those selected for the second and third follow-up samples. For any student who had ever enrolled in postsecondary education, complete transcript information was requested from the institutions indicated by the student.

Sample weights. The general purpose of weighting is to compensate for the unequal probability of selection into the sample, and to adjust for respondent nonresponse to the survey. The weights are based on the inverse of the selection probabilities at each stage of the sample selection process and on nonresponse adjustment factors computed within weighting cells. The fourth follow-up had two major components: the collection of survey data, and the collection of postsecondary transcript data. Nonresponse occurred during both of these data collection phases. Weights were computed to account for nonresponse during either phase. For the survey data, two

[2]R. Tourangeau, H. McWilliams, C. Jones, M. Frankel, and F. O'Brien, *High School and Beyond First Follow-Up (1982) Sample Design Report* (Chicago: National Opinion Research Center, 1983).

[3]See Tables 2.4-1 through 2.4-4 in C. Jones and B. D. Spencer, *High School and Beyond Second Follow-Up (1984) Sample Design Report* (Chicago: National Opinion Research Center, 1985).

weights were computed: the first weight (FU4WT) was computed for all fourth follow-up respondents; and the second weight (PANEL5WT) was computed for all fourth follow-up respondents who also participated in the base-year and first, second, and third follow-up surveys. For more information about the design and implementation of the survey weights, see the *High School and Beyond Fourth Follow-up Methodology Report*.[4]

BACKGROUND DIFFERENCES ACCORDING TO DEGREE ATTAINMENT

Among 1980 high school sophomores included in this study, differences in demographic and academic characteristics were readily apparent across educational attainment levels (table B1). However, it must be noted that the high school graduates, associate's degree recipients, and bachelor's degree recipients discussed in this report are a subset of all those in the cohort with one of these three levels of education. Those who spent six or more months enrolled in a postsecondary institution between their highest degree attainment and February 1992 were excluded from the study (in addition, 2 percent of cohort members with a high school education, 12 percent of associate's degree recipients, and 11 percent of bachelor's degree recipients were excluded because of missing data). This criterion for exclusion results in a pattern of missing data which may overstate the differences in demographic and academic characteristics between those with each level of education.[5] Across attainment groups included in the study, variation was most pronounced by levels of SES, academic achievement and ability, and early family formation.

- Bachelor's degree recipients were twice as likely to be in the top SES quartile (47 percent) as associate's degree recipients (20 percent), who in turn were twice as likely to be in the top SES quartile as students whose highest attainment was a high school diploma (10 percent).
- Graduates' academic ability was positively associated with their educational attainment. Among 1980 high school sophomores who attained a bachelor's degree, for instance, 58 percent were in the top test score quartile. In contrast, of those with no more than a high school diploma, ó percent were in the top test score quartile. Associate's degree recipients fell in between the percentages for these two groups, with 23 percent in the top test score quartile.

[4]D. Zahs, S. Pedlow, M. Morrissey, P. Marnell, and B. Nichols, *The High School and Beyond Fourth Follow-Up Methodology Report* (Washington, DC: U.S. Department of Education, National Center for Education Statistics, Postsecondary Longitudinal Studies Branch, 1994), Section 3.

[5]For an overview of the characteristics of the entire 1980 Sophomore Cohort by educational attainment by 1992, see J. Tuma and S. Geis, *Educational Attainment of 1980 High School Sophomores by 1992* (Washington, DC: U.S. Department of Education, National Center for Education Statistics, 1994).

Table B1—Percentage distributions (by columns) of the 1980 High School Sophomore Cohort and the three educational attainment groups included in this study,[1] by selected demographic and academic characteristics

	Entire Sophomore Cohort	Included in this study		
		High school diploma	Associate's degree	Bachelor's degree
Total	100.0	100.0	100.0	100.0
Gender				
Male	49.7	52.1	39.8	50.5
Female	50.3	47.9	60.2	49.5
Race–ethnicity				
Native American/Alaskan Native	1.1	1.3	0.8	0.4
Asian/Pacific Islander	1.1	0.6	0.6	1.5
Black, non-Hispanic	13.3	14.7	9.2	7.3
White, non-Hispanic	76.5	74.3	83.0	87.0
Hispanic	7.9	9.0	6.4	3.8
Socioeconomic status 1980				
Bottom quartile	23.5	36.8	19.7	7.2
Middle quartiles	51.9	53.6	60.1	45.4
Top quartile	24.6	9.7	20.1	47.4
Test score composite 1982				
Bottom quartile	25.3	38.9	13.5	3.8
Middle quartiles	50.7	55.0	63.6	38.6
Top quartile	24.0	6.1	22.9	57.6
Control of high school				
Public	90.8	96.4	91.7	82.3
Private or parochial	9.2	3.6	8.3	17.7
Type of start in postsecondary education				
Enrolled October 1982 or earlier	79.8	([2])	71.4	92.1
Enrolled November 1982 or later	20.2	([2])	28.6	7.9
Marital status as of February 1984				
Never married	81.6	70.7	88.5	97.7
Divorced/separated/widowed	1.5	2.4	1.0	0.4
Married or cohabit as married	16.9	26.9	10.5	1.9
Had a child as of February 1984				
Yes	11.8	18.7	6.3	0.8
No	88.2	81.3	93.7	99.2

[1]Includes only those who had fewer than 6 months of postsecondary enrollment between degree attainment and February 1992, and whose highest credential by 1992 was a high school diploma, an associate's degree, or a bachelor's degree.
[2]Does not apply.

NOTE: Percentages may not sum to 100 due to rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School & Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

- Graduates' level of degree attainment was also associated with their early family formation. One in four high school graduates with no further credentials by 1992 were married in 1984 (when most of the cohort had been out of high school for 2 years), compared with about one in 10 of their peers who had earned associate's degrees and 2 percent of those with bachelor's degrees.
- About 19 percent of graduates who attained a high school diploma and no other credential had a child by 1984, compared with 6 percent of associate's degree attainers and 1 percent of bachelor's degree attainers.

ACCURACY OF ESTIMATES

The statistics in this report are estimates derived from a sample. Two broad categories of error occur in such estimates: sampling and nonsampling errors. Sampling errors occur because observations are made only on samples of students, not on entire populations. Nonsampling errors occur not only in sample surveys but also in complete censuses of entire populations.

Nonsampling errors can be attributed to a number of sources: inability to obtain complete information about all students in all institutions in the sample (some students or institutions refused to participate, or students participated but answered only certain items); ambiguous definitions; differences in interpreting questions; inability or unwillingness to provide correct information; mistakes in recording or coding data; and other errors of collecting, processing, sampling, and imputing missing data.

DATA ANALYSIS SYSTEM

The estimates presented in this report were produced using the NCES Data Analysis System (DAS) for the HS&B Fourth Follow-up. The DAS software enables users to specify and generate their own tables from the HS&B data. With the DAS, users can re-create or expand upon the tables presented in this report. In addition to the table estimates, the DAS calculates proper standard errors[6] and weighted sample sizes for these estimates. For example, table B2 presents the standard errors that correspond to the data presented in table 9 in the text, and was generated by the DAS. If the number of valid cases is too small to produce a reliable estimate (fewer than 30 cases), the DAS prints the message "low-N" instead of the estimate.

[6]The HS&B sample is not a simple random sample, and therefore, simple random sample techniques for estimating sampling error cannot be applied to these data. The DAS takes into account the complexity of the sampling procedures and calculates standard errors appropriate for such samples. The method for computing sampling errors used by the DAS involves approximating the estimator by the linear terms of a Taylor series expansion. This procedure is typically referred to as the Taylor series method.

Table B2—Standard errors for table 9: Percentage distribution of employment status in the first 18 months after highest degree attainment among 1980 high school sophomores,[1] by degree group and selected demographic characteristics

	Continuously employed	Sporadically employed	Not employed
		High school diploma	
Total	1.10	1.22	1.06
Gender			
Male	1.68	1.72	1.28
Female	1.35	1.63	1.49
Race–ethnicity			
Native American/Alaskan Native	6.21	7.09	5.41
Asian/Pacific Islander	6.32	10.73	8.78
Black, non-Hispanic	2.70	3.44	3.25
White, non-Hispanic	1.29	1.44	1.11
Hispanic	3.04	3.84	3.39
Socioeconomic status 1980			
Bottom quartile	1.80	2.06	1.79
Middle quartiles	1.62	1.70	1.26
Top quartile	3.68	4.15	3.62
		Associate's degree	
Total	2.47	2.50	1.15
Gender			
Male	4.05	4.08	1.56
Female	3.13	3.24	1.67
Race–ethnicity			
Native American/Alaskan Native	([2])	([2])	([2])
Asian/Pacific Islander	([2])	([2])	([2])
Black, non-Hispanic	9.53	9.50	2.01
White, non-Hispanic	2.76	2.76	1.32
Hispanic	7.16	6.24	4.00
Socioeconomic status 1980			
Bottom quartile	6.40	5.97	3.39
Middle quartiles	3.26	3.34	1.50
Top quartile	5.62	5.56	2.97
		Bachelor's degree	
Total	1.50	1.43	0.48
Gender			
Male	2.13	2.08	0.53
Female	2.02	1.97	0.81

Table B2—Standard errors for table 9: Percentage distribution of employment status in the first 18 months after highest degree attainment among 1980 high school sophomores,* by degree group and selected demographic characteristics—Continued

	Continuously employed	Sporadically employed	Not employed
Race–ethnicity			
Native American/Alaskan Native	(2)	(2)	(2)
Asian/Pacific Islander	6.23	5.91	2.93
Black, non-Hispanic	4.96	4.80	2.16
White, non-Hispanic	1.61	1.53	0.51
Hispanic	7.42	7.53	1.47
Socioeconomic status 1980			
Bottom quartile	4.72	4.43	1.99
Middle quartiles	2.15	2.11	0.60
Top quartile	2.35	2.23	0.75

[1]Includes only those who had fewer than 6 months of postsecondary enrollment between degree attainment and February 1992, and whose highest credential by 1992 was a high school diploma, an associate's degree, or a bachelor's degree.
[2]Not available.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School & Beyond (HS&B) study, 1980–1992 Sophomore Cohort, Data Analysis System.

In addition to tables, the DAS will also produce a correlation matrix of selected variables to be used for linear regression models. Included in the output with the correlation matrix are the design effects (DEFT) for all the variables identified in the matrix. Since statistical procedures generally compute regression coefficients based on simple random sample assumptions, the standard errors must be adjusted with the design effects to take into account the HS&B stratified sampling method. (See discussion under "Statistical Procedures" below for the adjustment procedure.)

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STATISTICAL PROCEDURES

Two types of statistical procedures were used in this report: testing differences between means, and adjustment of means after controlling for covariation among a group of variables. Each procedure is described below.

Differences Between Means

The descriptive comparisons in this report were tested using Student's t statistic. Differences between estimates were tested against the probability of a Type I error, or significance level. The significance levels were determined by calculating the Student's t values for the differences between each pair of means or proportions and comparing these with published tables of significance levels for two-tailed hypothesis testing.

Student's t values may be computed to test the difference between estimates with the following formula:

$$t = \frac{E_1 - E_2}{\sqrt{se_1^2 + se_2^2}} \qquad (1)$$

where E_1 and E_2 are the estimates to be compared and se_1 and se_2 are their corresponding standard errors. Note that this formula is valid only for independent estimates. When the estimates were not independent (for example, when comparing the percentages across a percentage distribution), a covariance term was added to the denominator of the t-test formula.

There are hazards in reporting statistical tests for each comparison. First, comparisons based on large t statistics may appear to merit special attention. This can be misleading since the magnitude of the t statistic is related not only to the observed differences in means or percentages but also to the number of students in the specific categories used for comparison. Hence, a small difference compared across a large number of students would produce a large t statistic.

A second hazard in reporting statistical tests for each comparison occurs when making multiple comparisons among categories of an independent variable. For example, when making paired comparisons among different levels of income, the probability of a Type I error for these comparisons taken as a group is larger than the probability for a single comparison. When more than one difference between groups of related characteristics or "families" are tested for statistical significance, one must apply a standard that assures a level of significance for all of those comparisons taken together.

Comparisons were made in this report only when $p \leq .05/k$ for a particular pairwise comparison, where that comparison was one of k tests within a family. This guarantees both that the individual comparison would have $p \leq .05$ and that for k comparisons within a family of possible comparisons, the significance level for all the comparisons will sum to $p \leq .05$.[7]

For example, in comparing the percentages of males and females who were enrolled in postsecondary education only one comparison is possible (males versus females). In this family, k=1, and the comparison can be evaluated without adjusting the significance level. When students are divided into five racial–ethnic groups and all possible comparisons are made, then k=10, and the significance level of each test must be $p \leq .05/10$, or $p \leq .005$. The formula for calculating family size (k) is as follows:

$$k = \frac{j(j-1)}{2} \qquad (2)$$

where j is the number of categories for the variable being tested. In the case of race–ethnicity, there are five racial–ethnic groups (Native American /Alaskan Native; Asian/Pacific Islander; black, non-Hispanic; Hispanic; and white, non-Hispanic). Thus, when substituting 5 for j in equation 2, one gets the following formula:

$$k = \frac{5(5-1)}{2} = 10$$

Adjustment of Means

Tabular results are limited by sample size when attempting to control for additional factors that may account for the differences observed between two variables. For example, when examining the percentages of those who were continuously employed, it is impossible to know to what extent the observed variation is due to SES differences and to what extent it is due to differences in other factors related to SES, such academic ability, race–ethnicity, and so on. However, if a nested table were produced showing SES according to levels of academic ability by race–ethnicity, the cell sizes would be too small to identify the patterns. When the sample size becomes too small to support controls for another level of variation, one must use other methods to take such variation into account.

[7]The standard that $p \leq .05/k$ for each comparison is more stringent than the criterion that the significance level of the comparisons should sum to $p \leq .05$. For tables showing the t statistic required to ensure that $p \leq .05/k$ for a particular family size and degrees of freedom, see Olive Jean Dunn, "Multiple Comparisons Among Means," *Journal of the American Statistical Association* 56: 52–64.

To overcome this difficulty, multiple linear regression was used to obtain means that were adjusted for covariation among a list of control variables. Adjusted means for subgroups were obtained by regressing the dependent variable on a set of descriptive variables such as gender, race–ethnicity, SES, and so on. Substituting ones or zeros for the subgroup characteristic(s) of interest and the mean proportions for the other variables results in an estimate of the adjusted proportion for the specified subgroup, holding all other variables constant. For example, consider a hypothetical case in which two variables, age and gender, are used to describe an outcome Y (such as completing a degree). The variables age and gender are recoded into a dummy variable representing age and a dummy variable representing gender:

Age	A
24 years or older	1
Under 24 years old	0

and

Gender	G
Female	1
Male	0

The following regression equation is then estimated from the correlation matrix output from the DAS:

$$\hat{Y} = a + b_1A + b_2G \qquad (3)$$

To estimate the adjusted mean for any subgroup evaluated at the mean of all other variables, one substitutes the appropriate values for that subgroup's dummy variables (1 or 0) and the mean for the dummy variable(s) representing all other subgroups. For example, suppose we had a case where Y was being described by age (A) and gender (G), coded as shown above, and the means for A and G are as follows:

Variable	Mean
A	0.355
G	0.521

Suppose the regression equation results in the following equation:

$$\hat{Y} = 0.15 + (0.17)A + (0.01)G \quad (4)$$

To estimate the adjusted value for older students, one substitutes the appropriate parameter values into equation 3.

Variable	Parameter	Value
a	0.15	—
A	0.17	1.000
G	0.01	0.521

This results in the following equation:

$$\hat{Y} = 0.15 + (0.17)(1) + (0.01)(0.521) = 0.325 \quad (5)$$

In this case, the adjusted mean for older students is 0.325 and represents the expected outcome for older students who resemble the average student across the other variables (in this example, gender). In other words, the adjusted percentage who completed a degree after controlling for age and gender is 32.5 percent (0.325 x 100 for conversion to a percentage). For a discussion of the advantages and limitations of this model, see Aldrich and Nelson (1984).[8]

It is relatively straightforward to produce a multivariate model using the HS&B DAS, since one of the output options of the DAS is a correlation matrix, computed using pairwise missing values.[9] This matrix can be used by most commercial regression packages as the input data to produce least-squares regression estimates of the parameters. That was the general approach used for this report, with an additional adjustment to incorporate the complex sample design into the statistical significance tests of the parameter estimates (described below).

Most commercial regression packages assume simple random sampling when computing standard errors of parameter estimates. Because of the complex sampling design used for the

[8] *Linear Probability, Logit, and Probit Models*, J.H. Aldrich and F.D. Nelson, Sage University Paper series on Quantitative Applications in the Social Sciences, series no. 07-045 (Beverly Hills and London: Sage Publications, 1984).

[9] Although the DAS simplifies the process of making regression models, it also limits the range of models. Analysts who wish to use a procedure other than pairwise treatment of missing values or to estimate probit/logit models can apply for a restricted data license from NCES.

HS&B survey, this assumption is incorrect. A better method for approximating the standard errors is to multiply each standard error by the design effect associated with the independent variable (DEFT),[10] where the DEFT is the ratio of the true standard error to the standard error computed under the assumption of simple random sampling. It is calculated by the DAS and produced with the correlation matrix. For more information about multiple regression and the weighted least squares (WLS) technique, see Lewis-Beck (1980) and Lee et al. (1989).[11]

[10]The adjustment procedure and its limitations are described in *Analysis of Complex Surveys*, C.J. Skinner, D. Holt, and T.M.F. Smith, eds. (New York: John Wiley & Sons, 1989).

[11]*Applied Regression*, M.S. Lewis-Beck, Sage University Paper series on Quantitative Applications in the Social Sciences, series no. 07-022 (Beverly Hills and London: Sage Publications, 1980) and *Analyzing Complex Survey Data*, E.S. Lee, R.N. Forthofer, and R.J. Lorimor, Sage University Paper series on Quantitative Applications in the Social Sciences, series no. 07-071 (Beverly Hills and London: Sage Publications, 1989).

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